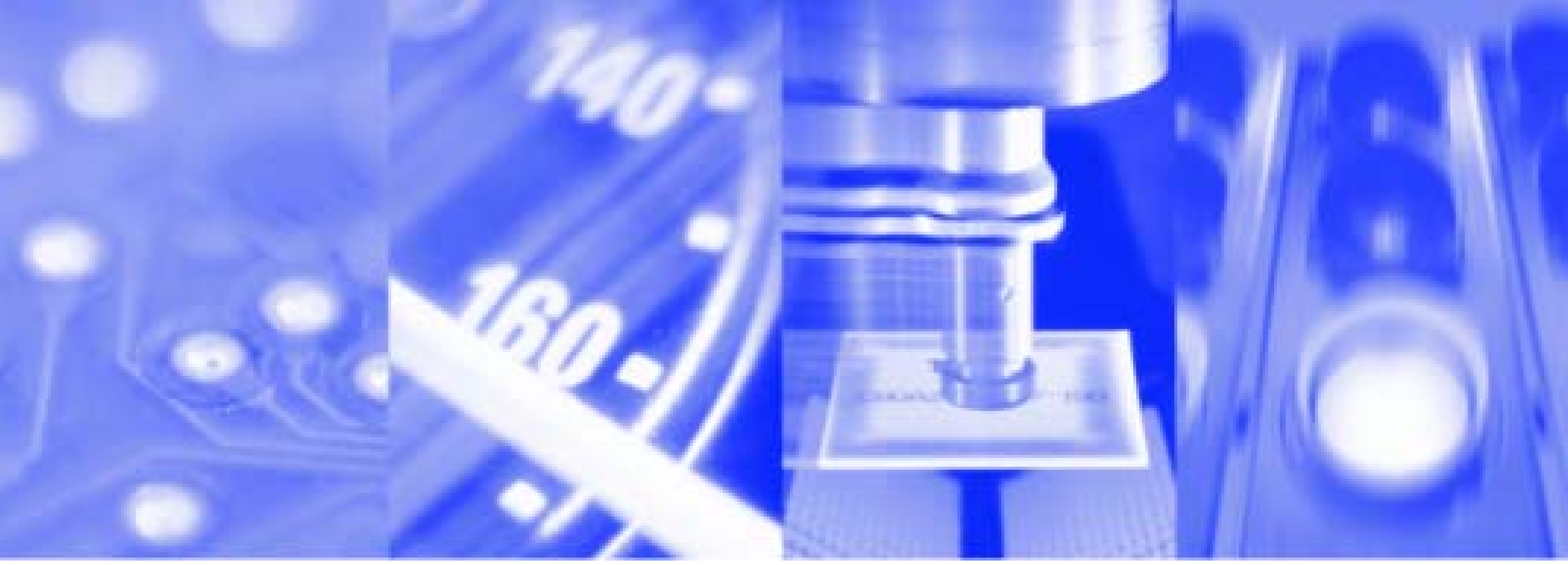
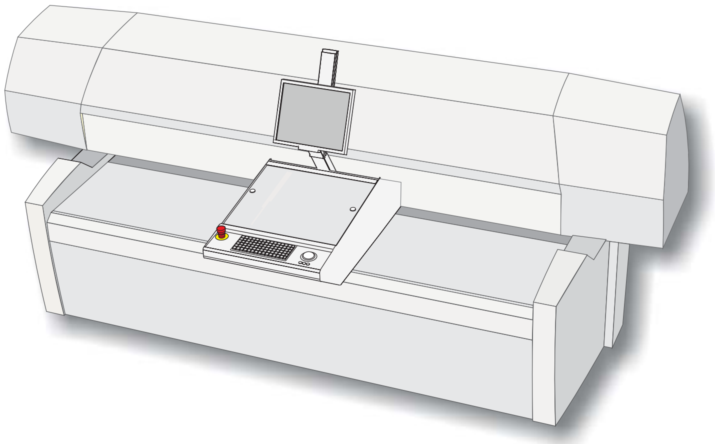


MY100-10/14



Service Manual

TPSys™ 2.9

Original Instructions

English

P-050-0101

MY100-10/14

Component Placement Machines

Service Manual

Original Instructions

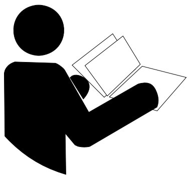
English

This document is intended for the MY100-10/14 running the TPSys software version 2.9.

A standard system and available options are covered by this document. Depending on your system configuration you may lack some of the features mentioned in the document.

Disclaimer
Hardware and software mentioned in this document are subjected to continuous development and improvement. Consequently, there may be minor discrepancies between the information in the document and the performance or design of the product. Specifications, dimensions and other statements mentioned in this document are subject to changes without prior notice.

Federal Communications Commission (FCC)
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



Do not start, operate or service the machine until you have read and understood the safety chapter.

Micronic Mydata AB, PO Box 3141, SE-183 03 Täby, Sweden.
Phone +46 8 638 52 00 – Fax +46 8 638 52 90 – Internet www.mydata.com

Table of Contents

13. Component Feeding Systems 13-1

Text Conventions

This document uses text conventions to present information in various situations. This is explained below.

Danger, Warning, Caution, and Note

In this document a particular text layout is used to make danger, warning, and caution information evident. A triangular icon identifies the type of risk and the text describes the risk.

Danger, warning, and caution information **must** be followed.

Assisting information, notes, have the same layout but never triangular icons.

Danger

DANGER! Danger means a potentially dangerous situation that can cause death or severe bodily injury. The icon identifies the type of risk.

Warning

WARNING! Warning means a potentially dangerous situation that can cause bodily injury or considerable damage to the system or equipment. The icon identifies the type of risk.

Caution

CAUTION! Caution means that the system or equipment can be damaged or data be lost. To distinguish caution information from warning and danger information, this icon is always an empty triangle.

Note, example 1

A note contains any type of assisting information.

Note, example 2

One type of assisting information is tips, which normally have this icon.

Italic Font

Italic font is used for software screen text (for example *Parameter 1*), names (for example *Spare Parts Catalog*), and for warning text (described in the previous section).

Bold Font

Bold font is used for particular important words (for example, This **must not** be done in reverse order).

Menu Selections

When describing software handling, menu selections are described in the following format:

File > *Page Setup* > *Paper Size* > *Portrait* > *OK*

This example describes to open the *File* menu and select the *Page Setup*, *Paper Size*, and *Portrait* options, and finally click the *OK* button.

Lists

Lists of items, points to consider, or procedures that have no relative order appear in bulleted or hyphenated format like this:

- Item 1.
- Item 2.

or

  – Item 1.
  – Item 2.

Procedures that must be performed in a specific order appear in numbered lists like this:

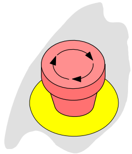
1. Perform this step first.
2. Perform this step second.

1. Safety

Before starting the machine, it is necessary that the operator, foreman and any other personnel involved in machine operation, maintenance or service understand and follow these points:

- This machine is designed to pick components from their packaging and place them onto printed circuit boards, and to apply glue. The machine must be used exclusively for these two purposes and nothing else.
- The machine must be operated by qualified personnel only. Qualified personnel should meet the following qualifications:
  - Be above 18 years of age.
  - Have normal depth perception, field of vision, reaction time, manual dexterity, coordination, and no tendency to dizziness.
  - Completed operators training.
- All personnel involved in machine operation must understand the use of the emergency stop buttons and how to manually move machine elements in case of emergency. See the *Emergency Stop Button* and *Emergency Movement of Machine Elements* sections in this chapter.
- Anyone operating this machine must obey all warning signs. See the *Warning Signs* section in this chapter.
- At least one manual that describes the warning signs of the particular machine type must always be kept, for instance if the machine is upgraded with a later TPSys version.
- Apart from the daily maintenance described in the operator's manual, the machine is to be serviced by authorized maintenance engineers only.
- Excess component tape from tape magazines shall be cut from the front of the machine when it is not in operation.
- When inserting or removing tools to or from the tool bank, the emergency stop button shall be pressed down.
- The emergency stop button shall be pressed down when a tool or component is manually inserted or removed from the X wagon of the machine.
- If there is a risk that any unauthorized personnel might alter the system settings and thus the behavior of the machine, then the logon facility for individual access rights has to be used.
- Ensure that all covers and shields are intact, mounted and closed while the machine is in operation.
- Do not disable or disengage any safety switch or sensor.
- Do not configure or modify MYDATA machines or devices without consulting MYDATA. The machines, devices or the interfaces between them might become unsafe.
- Do not use chemicals or other substances that may have any influence on the operator or other personnel involved in the machine operation.

Emergency Stop Button



All MYDATA placement machines have red emergency stop buttons. These will stop all machine movements immediately when pressed down.

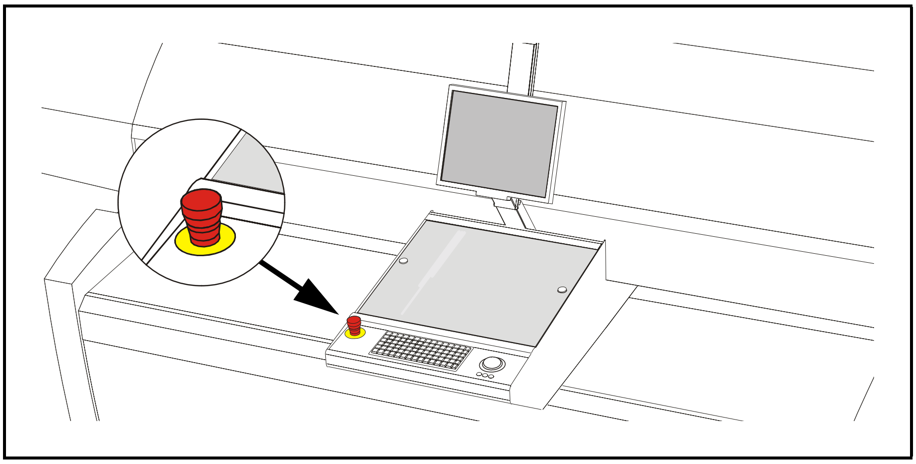


Figure 1-1. Emergency stop button.

There is one emergency stop button located at the front of the machine, at the keyboard. This emergency stop button is released by being turned clockwise.

WARNING! The emergency stop button must always be pressed down when hands, fingers, tools or other objects are within a shielded area or in the risk area of movable machine elements such as internal conveyors, Y wagon or Tray Wagon Magazine.

Emergency stop buttons on all MYDATA optional devices, such as TEX Tray Exchanger and conveyor systems, have the same function. They switch off all motors, and release movable machine elements.

Activating a stop system in an optional device, for instance opening a TEX Tray Exchanger door, stops only that optional device. The placement machine is not stopped by such an action.

Restart

To restart a machine after an emergency stop button has been released, enter any command on the keyboard.

Emergency Movement of Machine Elements

The X wagon, Y wagon, and Tray Wagon can be moved manually after pressing the emergency stop button down.

If an accident has occurred and an emergency movement of a machine element is required, use the following procedure:

1. Press the emergency stop button down.

   This will immediately stop the machine and disconnect the motors used to position the machine elements.

2. Move the machine element away by hand.

Warning Signs

The warning signs on the machine must be observed as this machine contains fast moving parts, magnetic fields, and high voltage. The machine has warning signs placed as shown on the following pages.

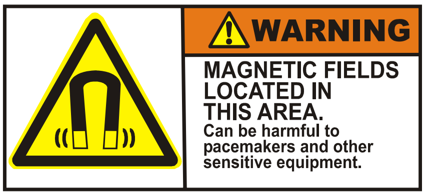
At least one manual that describes the warning signs of the particular machine type must always be kept, for instance if the machine is upgraded with a later TPSys version.

All signs must be kept clean and readable.

Magnetic Fields

1

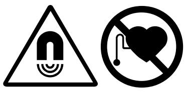
2



This sign warns for permanent magnets in the machine. They have extremely powerful magnetic fields.

The figures show signs according to:

- European and Canadian standards ('1').
- US standards ('2').



WARNING! Personnel wearing pace-makers must be careful in the vicinity of permanent magnets.

CAUTION! Do not approach permanent magnets when carrying objects made of iron, steel or nickel.

CAUTION! Do not wear watches near permanent magnets since they can be damaged.

CAUTION! Do not bring magnetic data media, check or credit cards near permanent magnets. The data on the data media may be erased by the magnetic field.

This sign is applied as follows.

– Two signs on the conveyor component shield (see Figure 1-2).

The magnets are located under the shield.

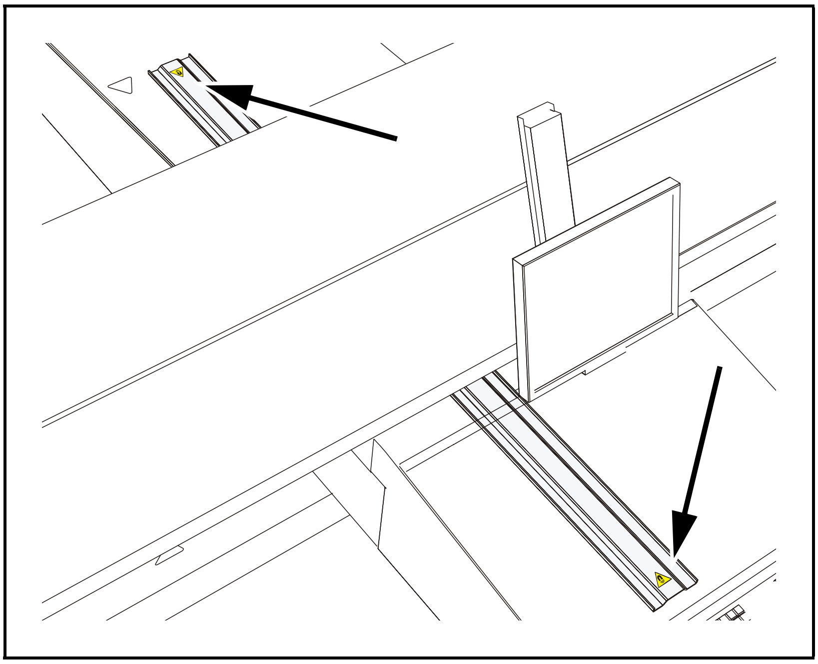


Figure 1-2. Signs warning for magnetic fields.

– Two signs on the X beam end plates.

On the X beam there is a row of magnets ('M' in Figure 1-3). These are used to power the X wagon.

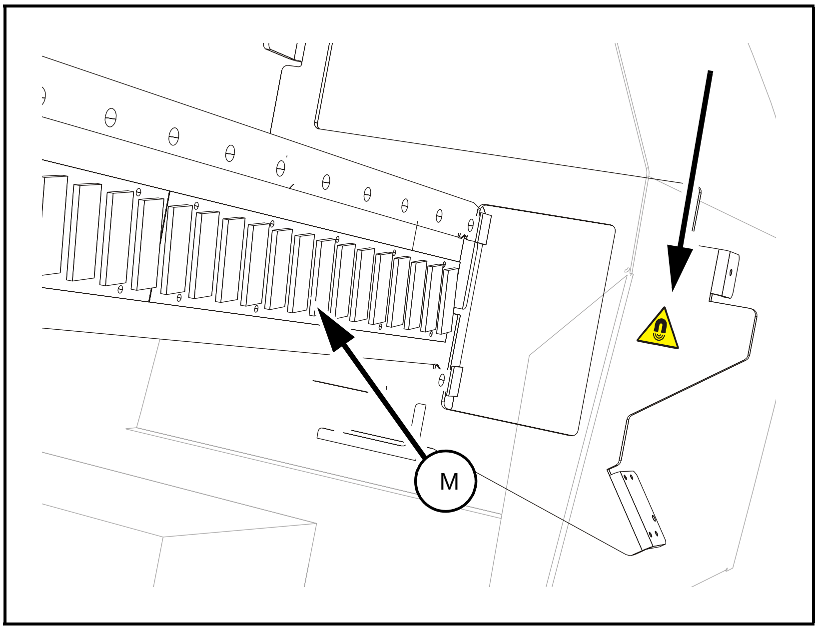
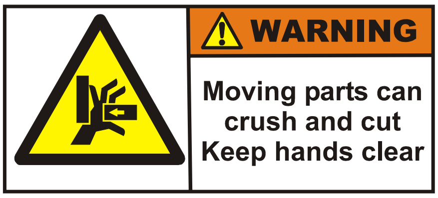


Figure 1-3. Warning sign on the right end plate.

Fast Moving Machinery

1 

2 

This sign warns of fast machine movements. Ensure that all covers and shields are intact, mounted and closed while the machine is in operation. Do not disable or disengage any safety switch or sensor.

The figures show signs according to:

– European and Canadian standards ('1').

– US standards ('2').

This sign is applied as follows.

– Two signs on the front glass shield, see Figure 1-4.

These signs warn of the fast X-wagon movement.

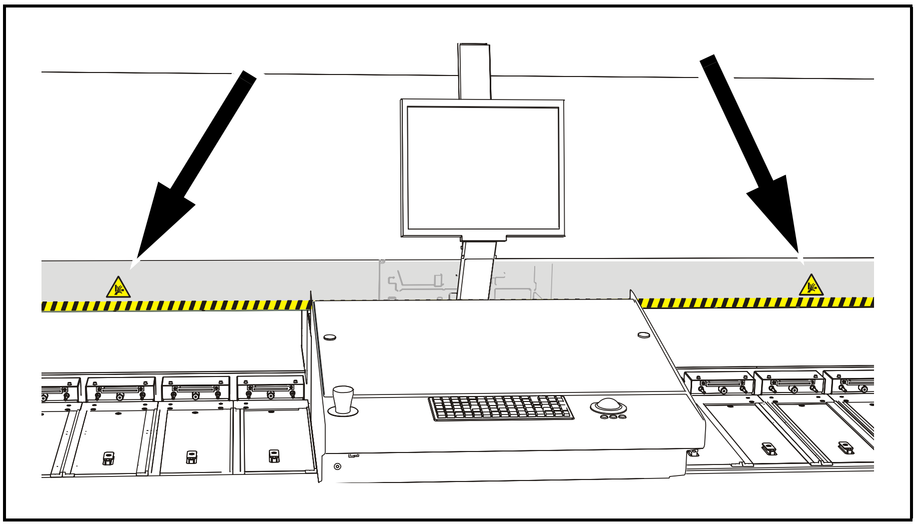


Figure 1-4. Warning signs and striped tape on the front glass.

A striped warning tape on the bottom of the glass shield indicates the dangerous area. No hands, fingers, or other objects are allowed beyond the glass shield.

– Two signs on the T3-T6 conveyor glass shield (on the rear of the machine), see Figure 1-5.

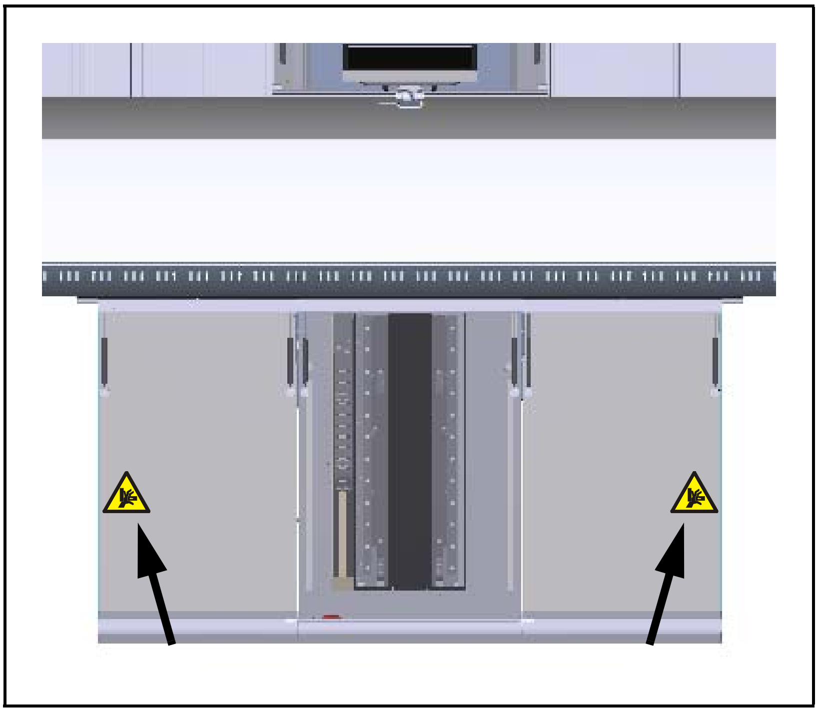
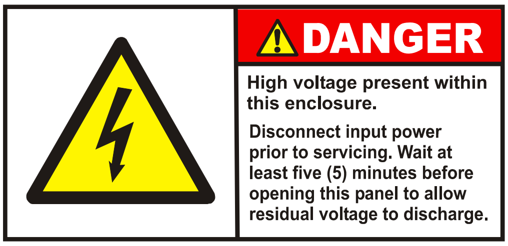


Figure 1-5. Signs on rear conveyor glass.

These signs warn of fast Y-wagon movements. No hands, fingers, or other objects are allowed beyond the glass shields.

Dangerous Voltage



This sign warns of dangerous residual voltage in an internal electronic cabinet (see Figure 1-6). This cabinet has powerful capacitors. When power is cut, these capacitors are still charged with live voltage. Only authorized service personnel are allowed to open the machine when such a unit is open.

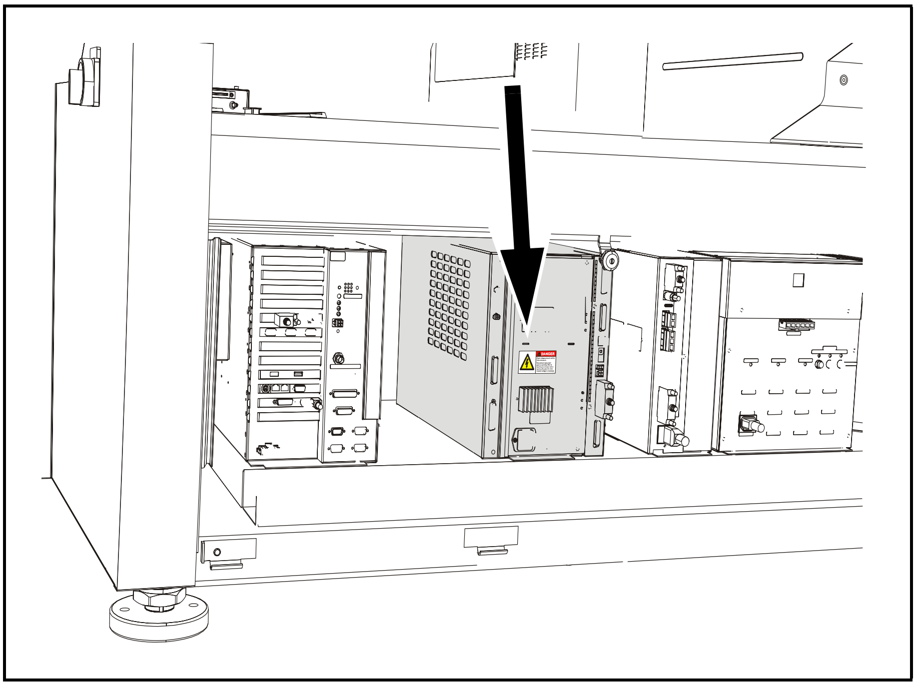
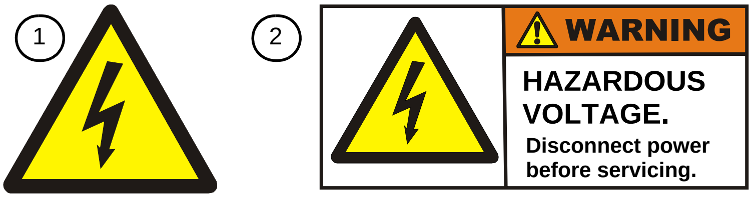


Figure 1-6. Electronic cabinet.

Disconnect input power before servicing the machine. Wait at least five minutes before opening the cabinet to allow residual voltage to be discharged.

DANGER! Always lock out and tag the main switch before opening the hoods and commencing any servicing within the machine.



This sign warns of electric shock. Units, on which this sign is placed, contain dangerous voltage levels. Power must be switched off before opening the unit. Only authorized service personnel are allowed to operate the machine when such a unit is open. Hazardous voltage is present with machine power off.

The figures show signs according to:

– European and Canadian standards ('1').

– US standards ('2').

This sign is applied as follows.

– One sign at the main switch, see Figure 1-7.

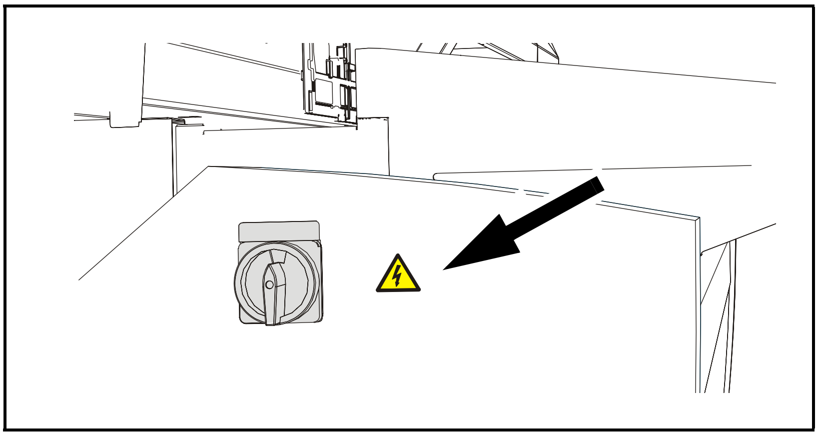


Figure 1-7. Sign at the main switch.

– One sign on the Power Input Unit (PIU) cover, inside the machine, see Figure 1-8.

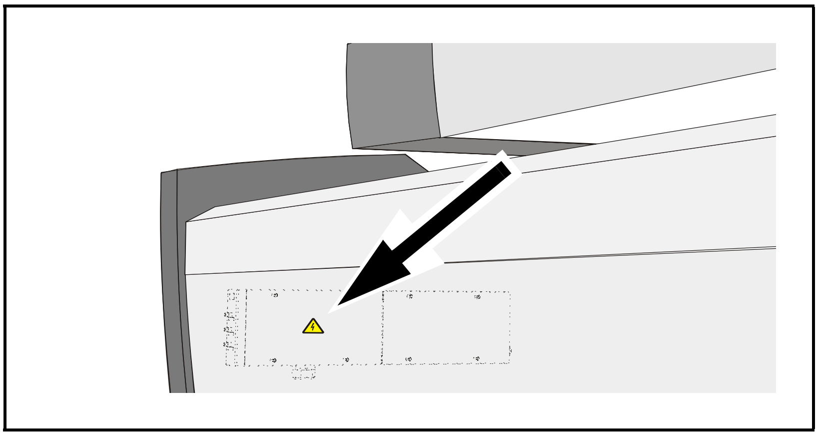
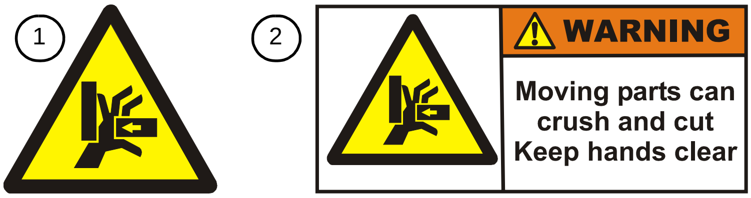


Figure 1-8. Sign on the PIU, inside the machine.

Fast Horizontal Movements



This sign warns of fast horizontal movements. The sign is located on optional Tray Wagon Magazines (TWM) and it is applied as follows.

– Two signs on the TWM (see Figure 1-9).

The figures show signs according to:

– European and Canadian standards ('1').

– US standards ('2').

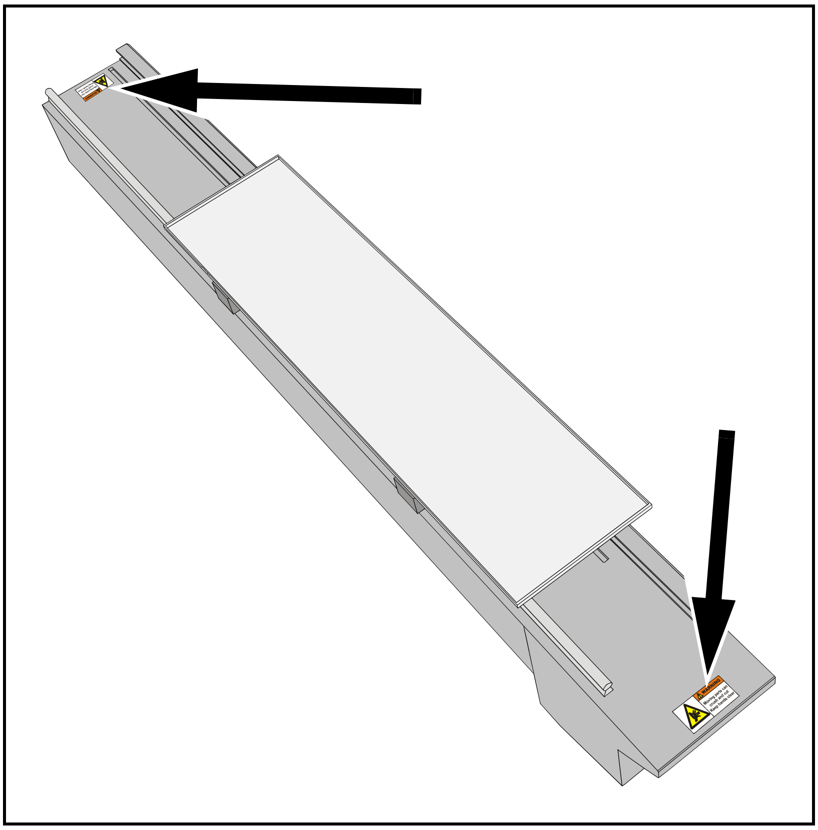
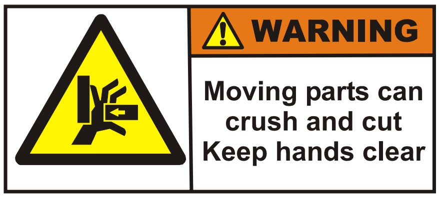


Figure 1-9. Signs on the TWM.

Sharp Edges

1

2



This sign warns of sharp edges on the steel strip. The sign is located on top of the X beam under the top cover. The sign is applied as follows.

- Two signs on top of the X beam. One sign in each end of the X beam (see Figure 1-10).

The figures show signs according to:

- European and Canadian standards ('1').
- US standards ('2').

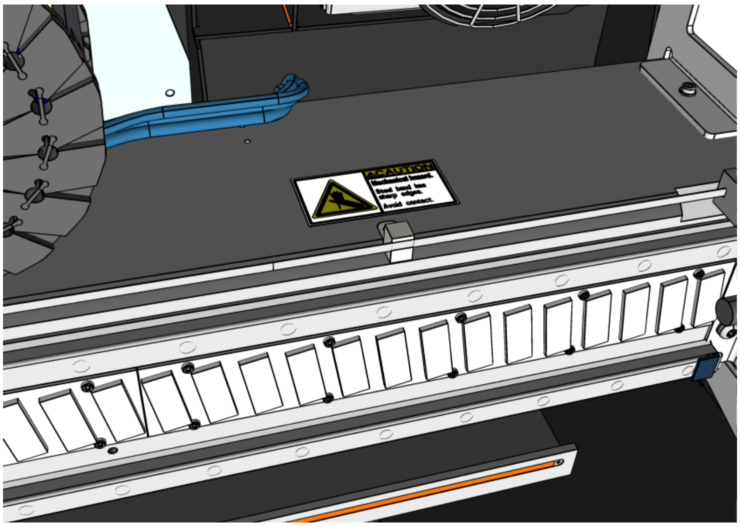
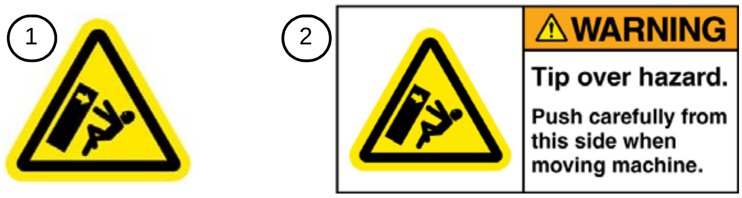


Figure 1-10. Signs on the X beam.

Moving the Machine



This sign warns of a tip over risk. There is always a tip over risk when moving the machine, especially if you push it in the backward direction.

The figures show signs according to:

- European and Canadian standards ('1').
- US standards ('2').

The machine is equipped with 2 signs at delivery. The warning signs should be removed after installation. If the machine has to be moved the warning signs must be applied again.

Apply the signs as shown in Figure 1-11.

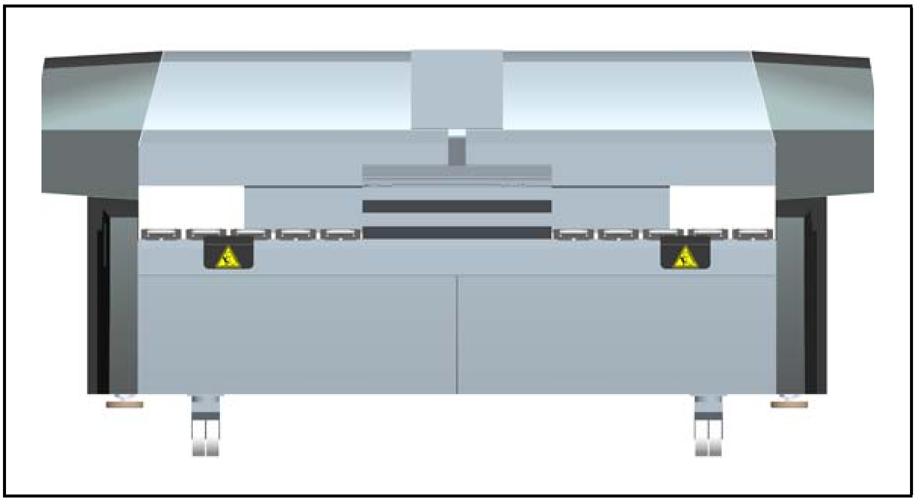


Figure 1-11. Warning signs to use when moving the machine.

Type Plate

A type plate shows the name and address of the manufacturer, the machine type and serial number, and manufacturing year and country. An example of a type plate is shown below.

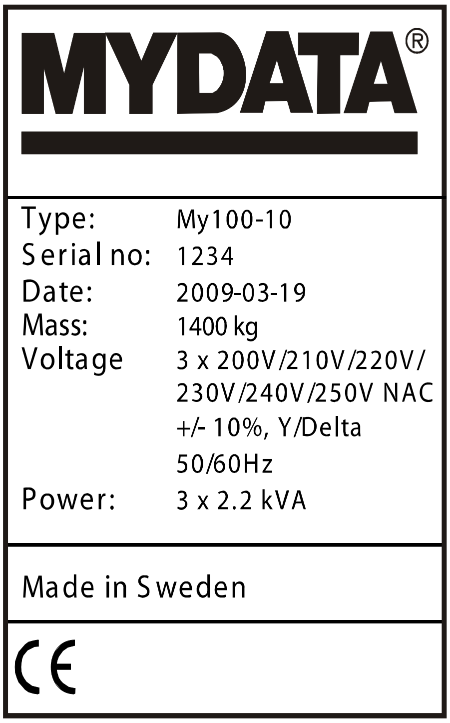


Figure 1-12. Machine type plate.

The type plate is found at the back of the machine, on the machine stand.

TEX Tray Exchanger

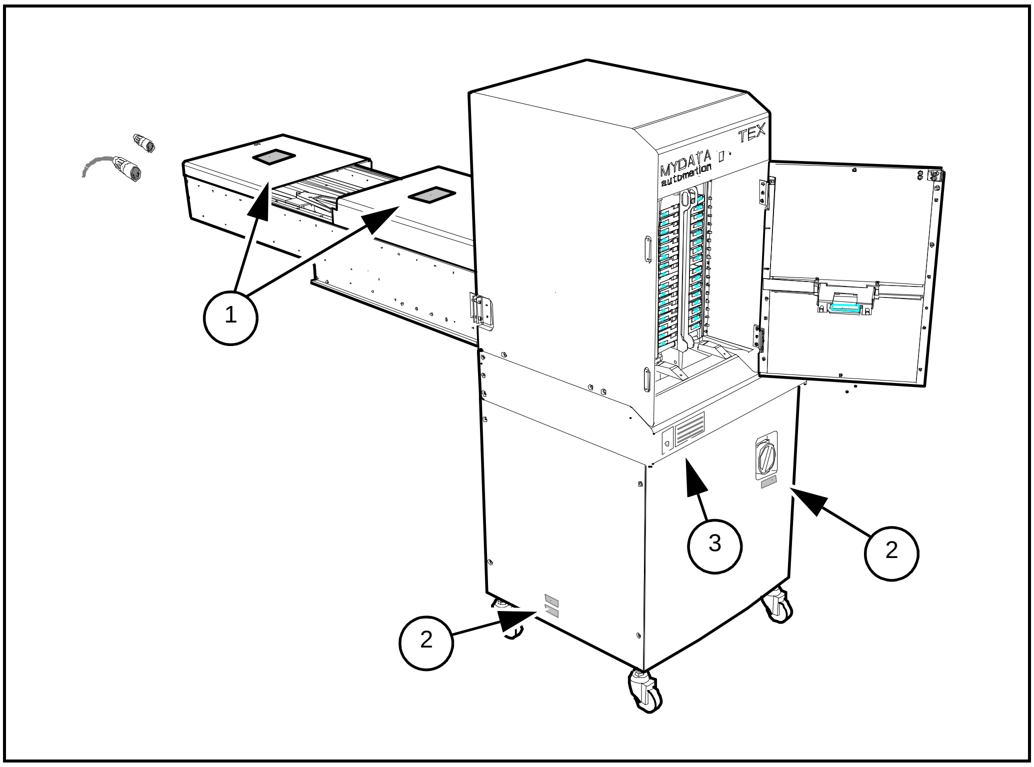


Figure 1-13. TEX Tray Exchanger.

Number and position of each sign type is described in the following text. If a sign is missing, it must be replaced immediately. Part numbers are printed on the signs, but can also be read from the following description.

TEX Tray Exchanger Emergency Stop

There are safety switches at the two hoods and at the door. When a switch is activated, all movements in the TEX Tray Exchanger are stopped immediately. The placement machine is not affected by these switches.

When the emergency stop button on the placement machine is pressed down, the TEX Tray Exchanger is also stopped.

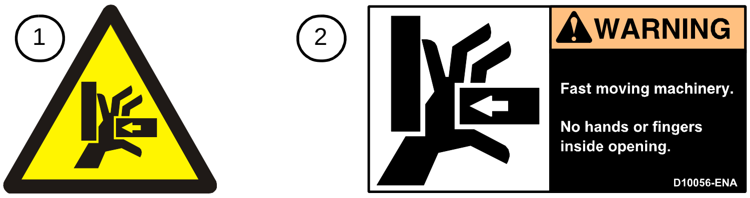
TEX Tray Exchanger can thus be stopped in following ways:

- The front door is opened.
- The front or rear cover is opened ('1' in Figure 1-13).
- The emergency stop button on the placement machine is pressed down.

TEX Tray Exchanger Warning Signs

The warning signs are located as shown in Figure 1-13.

1



Sign 1 warns of fast machine movements. Ensure that all covers and shields are intact, mounted and closed while the machine is in operation. Do not disable or disengage any safety switch or sensor.

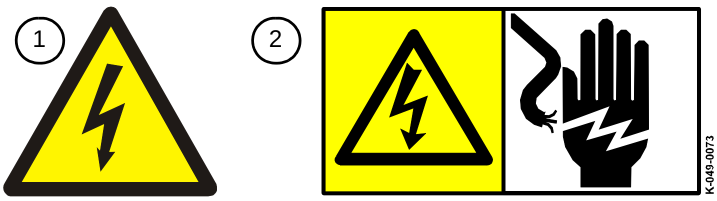
The figures show signs according to:

– European standards ('1').

– US and Canadian standards ('2').

Two warning signs are applied on the safety hoods as shown in Figure 1-13.

2



Sign 2 warns of electric shock. Units, on which this sign is placed, contain dangerous voltage levels. Power must be switched off before opening the unit. Only authorized service personnel are allowed to operate the machine when such a unit is open. Hazardous voltage is present with machine power off.

The figures show signs according to:

– European and Canadian standards ('1').

– US standards ('2').

Two warning signs are applied as shown in Figure 1-13.

3

Sign 3 (D-024-0345) states the laser classification for TEX units equipped with laser barcode scanner. One certification sign is applied as shown in Figure 1-13.

Glue Station

The glue station has a safety shield. This will ensure that no fingers or hands can pass beyond the machines glass shield.

Ensure that this cover is intact and mounted while the machine is in operation.

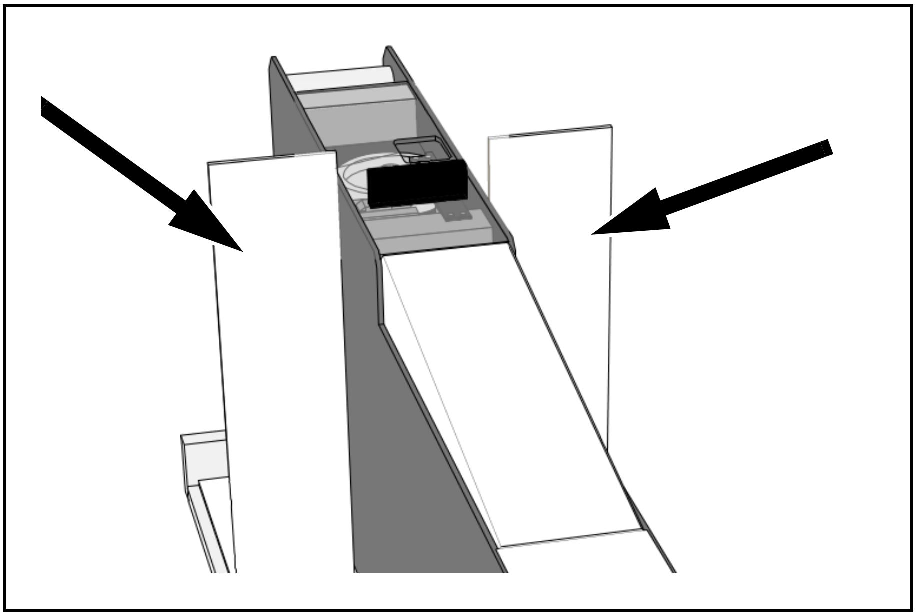


Figure 1-14. Glue station safety shields.

Warnings in the Manual

Throughout the manual this symbol is used to call your attention to commands that starts machine movements. The symbol refers to the warning signs, which must be obeyed to eliminate the risk of injury. If there are instructions accompanying this symbol, they must be followed.

Also, to avoid damage, this symbol means that the operator must be observant of the following:

Ensure that there are no foreign objects on the assembly table, near the tool bank, or within the X wagon, Y wagon, or Tray Wagon Magazine moving areas, and that the standard tool head and the HYDRA tools are in their upper positions.

Noise

For all MY machines, the equivalent continuous sound pressure level is measured in accordance with EU directive 98/37/EC to be less than 70 dB(A).

Material Safety Data Sheets

The machine is shipped with various types of grease and oil. Below are references to descriptions of chemical composition and toxicity (Material Safety Data Sheets, shortened to MSDS) of these products.

If you have problems accessing the web sites referenced below, contact MYDATA support.

Oil

HYDRAULIC OIL, Shell Tellus Oil 46

Request MSDS from your local distributor, or the manufacturer Royal Dutch Shell plc (http://www.shell.com).

Grease

GREASE PASTE OKS 270, part number K-013-0014

MSDS is found at http://www.mydata.com, document number P-040-0137-EN. A logon user name and password may be required.

GLEITMO 585 K

Request MSDS from your local distributor, or the manufacturer Fuchs-Lubritech Gmbh (http://www.fuchs-lubritech.com/cms).

GREASE PARALIQ GA 351, 25G

Request MSDS from your local distributor, or the manufacturer Klüber Lubrication (http://www.klueber.com).

GREASE AFA THK, part number K-035-0095

MSDS is found at http://www.mydata.com, document number P-045-0028-EN. A logon user name and password may be required.

OMEGA 28 GREASE, MYDATA part number L-012-0860

MSDS is found at http://www.mydata.com, document number P-040-0140-EN. A logon user name and password may be required.

Lead Acid Batteries

Batteries that may be included in the machine:

BATTERY LEAD 6V 12AH, MYDATA part number E-053-0001.
BATTERY 12V 7AH, UPS 151X65X94, MYDATA part number E-053-0002.
BATTERY 6V 4.5AH 101X47X70, MYDATA part number E-053-0003, used for instance in UPS EBK-350.

The manufacturer for the batteries above may vary over time. The batteries shipped with machines or data servers may have different manufacturers than after-sales batteries. For correct MSDS, locate the battery and read the manufacturer information, and refer to the table below for MSDS location.

Leader
http://www.celltech.internetbutik.se/produkter/upload_pdf/leader/msdsleader.pdf

Panasonic
http://www.panasonic.com/industrial/battery/oem/

Yuasa
http://www.yuasabatteries.com/pdfs/MSDS_LeadAcidBattery.pdf

In Case of Fire

Only use carbon dioxide (CO_2) extinguishers or dry chemical extinguishers in case of fire. Under no circumstances use water, as the machine contains electronic equipment.

ESD

ESD, ElectroStatic Discharge, is one of the few things an individual can unwittingly do to damage or destroy components. Much like the shock you receive when rubbing your feet on a carpet and then touching some metal. ESD can occur when working and will cause components you touch to no longer work properly.

How To Help Prevent ESD

The following steps help reducing the chances of ESD:

- Do not touch components unless you are constantly earthed by an ESD wrist strap or you are wearing ESD shoes or ESD shoe earthing strips on an ESD floor.
- Always ensure that people, the workplace and packaging are safely earthed when handling electrostatic sensitive components.
- If the packaging is not conductive, place the modules in a conductive envelope before packaging. Use ESD bags, domestic aluminum foil or paper, for example. **Never** use plastic bags or film.
- Make sure not to wear any clothing that collects electrical charge, such as a wool sweater or synthetic fibers.
- Most plastics can easily become charged and must therefore be kept away from components.
- Do not touch electronic modules unless it is absolutely necessary to do so in order to carry out other work. If it is necessary, make sure that you do not touch pins or printed conductors.

All MYDATA pick-and-place machines have jacks for wrist straps. They are marked with an ESD sign.

2. Installation

In this chapter you will find the following information:

Site Preparation

In this section you will find prerequisites of what is required of the site for a successful installation of a MYDATA Placement Machine. Details about the working area, environmental and electrical requirements, and regulatory compliance are given. Follow these directions to ensure a safe and proper installation, as well as ongoing operating efficiency.

Site Preparation Check List

1. Identify the desired location for the machine. Verify that enough space is available.
2. Verify that all environmental requirements are met.
   – Temperature
   – Humidity
   – Cleanliness/airborne contaminants.
3. Verify that the floor is level and can take the weight. Also ensure that the floor is constructed to keep machine vibrations to a minimum. It is not required to bolt the machine to the floor.
4. Plan the transportation route to the installation site.

WARNING! There is always a tip over risk when moving the machine, especially if you push it in the backward direction.

5. Verify that means for transportation and lifting are available (fork lift, crane etc.).
6. Obtain required, stable input power. See section *Electrical Requirements* on page 2-8.
7. Arrange for electrostatic avoidance equipment.
8. Network connection (optional).

Required Working Area

Prepare a suitable working area according to the dimensions shown in Figure 2-3 and Figure 2-5. The dimensions shown are the minimum space required for the machine with no extra options. To achieve a more efficient working area, add space for operating personnel and storage area for magazines, components etc.

Note that space around the machine is necessary for maintenance of the machine and optional equipment, if any.

General Site Requirements

The floor at the machine site must be level.

It is recommended that the area at the machine site is ESD (Electrostatic Discharge) protected.

Cables for mains and computer network are connected through the bottom of the machine's left gable (see Figure 2-5).

See MY100-Series P&P specification for detailed information about maximum machine noise for a particular machine model

Machine Weight

The floor, on which the machine is transported and finally positioned, must support the machine weight (the machine weight includes the T4 board handling system, but no magazines), which is:

See MY100-Series P&P specification for detailed information about machine weight for a particular machine model.

Weight distribution

The total weight of the MY100 machine is divided among the machine stands according to the table below.

Stand (foot)	MY100 -10	MY100 -14
	% of Total weight	% of Total weight
Rear left	35	36
Rear right	34	33
Front left	16	16
Front right	15	15

Shipping Gross Weight

The shipping gross weight depends on the quantity of delivered options. A usual gross weight is the machine weight plus approximately 300 kg.

Center of Gravity

Due to the rigid design of the machine frame, the center of gravity is **not** at the exact center of the machine gable. The center of gravity is slightly shifted against the back end of the machine. The table below shows the actual center of gravity on the MY100 machines.

Position	MY100 -10	MY100 -14
Behind front stand.	515 mm	521 mm
In front of rear stand.	236 mm	230 mm
Right of machine center.	20 mm	50 mm

The Figure below shows an example of the center of gravity on the MY100-14 machine.

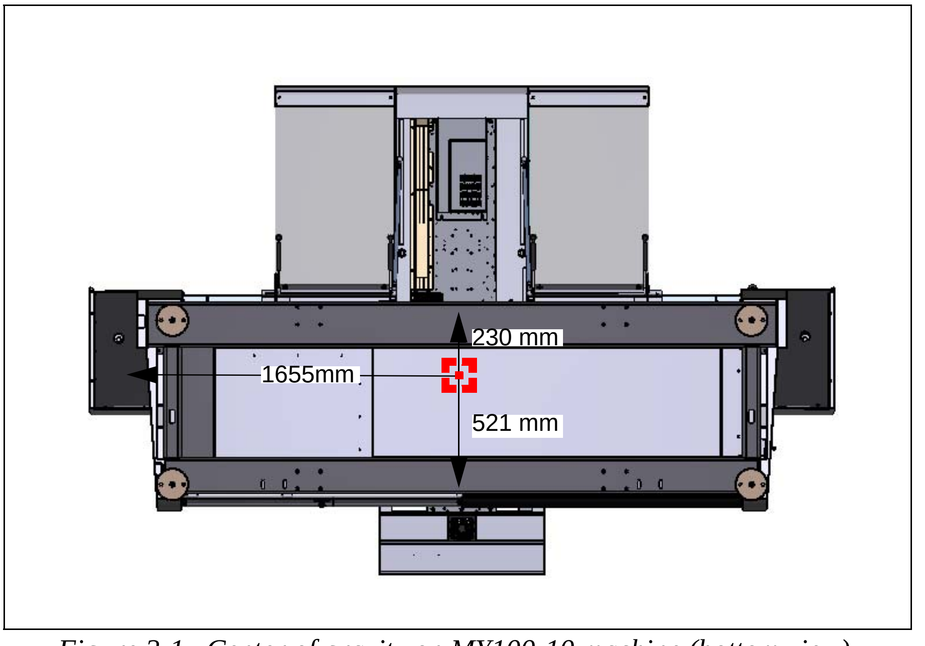


Figure 2-1. Center of gravity on MY100-10 machine (bottom view).

The center of gravity is also indicated by a label located at the lower end of the machine side covers (see Figure 2-2). This information will facilitate if the machine is lifted from the gable.

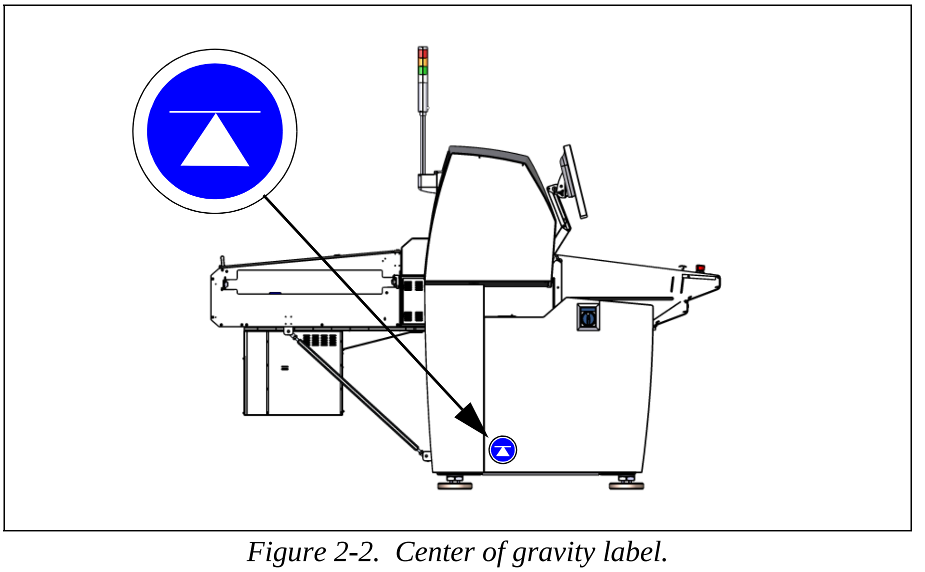


Figure 2-2. Center of gravity label.

Machine Dimensions

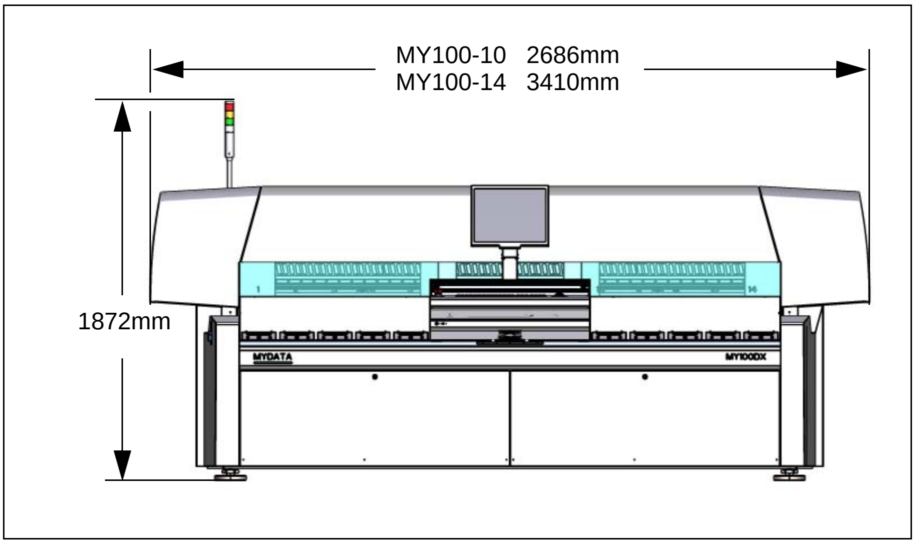


Figure 2-3. Main dimensions (Length & Height).

Figure 2-3 shows the main dimensions (in mm). Note that the height is not a fixed value since the feet are adjustable.

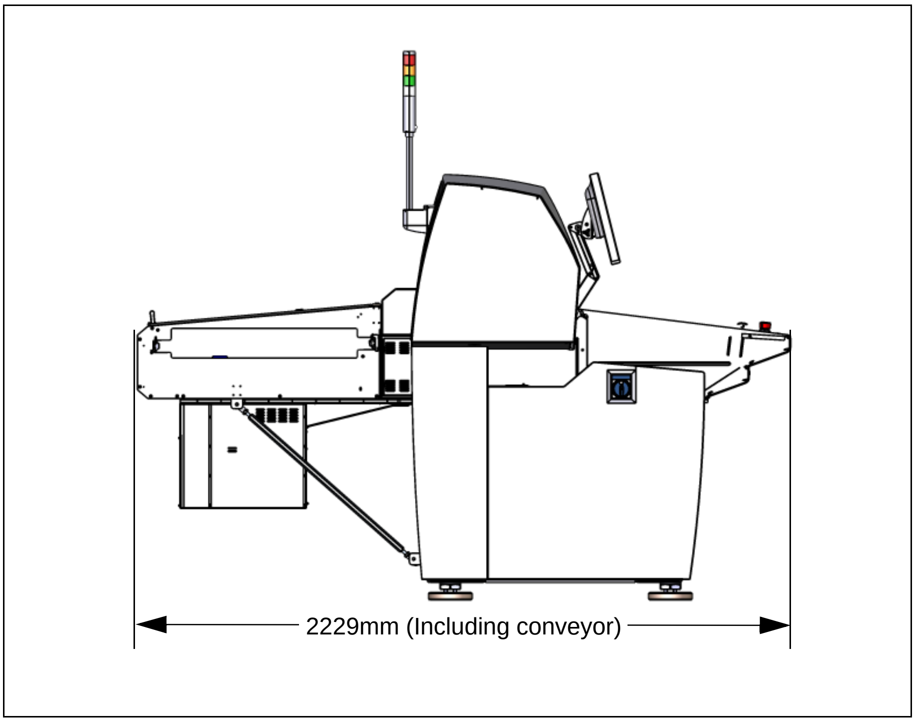


Figure 2-4. Main dimensions (Depth).

Floor Space Requirement

The machine will require the following floor space (see Figure 2-5) to allow sufficient space around the machine for service connections and servicing the machine.

The 700 mm space on each side of the machine is recommended for service of the machine, but this recommendation does not apply if there are external conveyors connected to the machine.

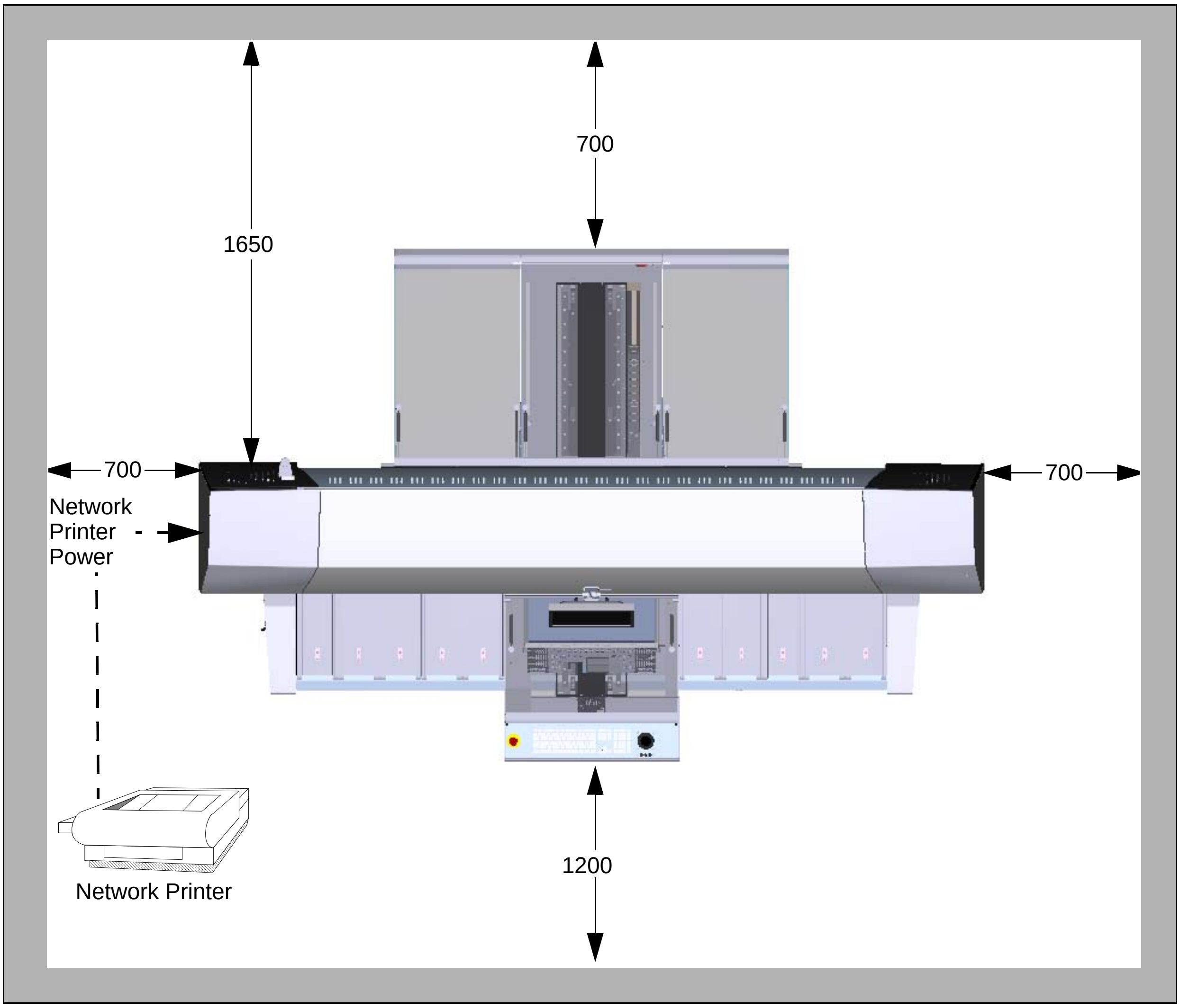


Figure 2-5. Clear space around the machine.

Figure 2-5 shows a top view over the required service area around the machine (measurements in mm).

Also the position of the network and power inlets are shown in Figure 2-5.

Environmental Requirements

Installation requirements

See MY100-Series P&P specification for detailed information about installation requirements for a particular machine model.

☞ Re calibration of the machine has to be done if the ambient temperature deviates more than +/-3 °C from the temperature at which the last calibration was done.
If the battery on the CPU board is subject to a cold environment for a longer period of time then the battery will loose power and the BIOS may loose its settings. If this is the case then the BIOS and time settings has to be set according to instructions in document P-019-0001c.

Altitude

The vacuum system is capable of operating correctly at altitudes up to 1000 m above mean sea level. Above this altitude you might need to reduce accelerations for a few packages.

Dust and dirt

The machine does not require a clean-room environment but dust and dirt must be kept as low as possible. The maintenance intervals are shortened by high temperature and a dusty or dirty environment.

The machine conform to the IP20 protection class (with exception to the open area where the X wagons move).

Electrical Requirements

The MY100 machine requires the following electrical conditions.

Three phase 50 to 60 Hz AC, 3 x 2.2 kVA, 5-wire connection, slow blow fuse (T).

The MY100 machine is subject to conditional connection. The impedance at the connection point shall be less than 0.02 ohm in order to comply with EN 61000-3-11 (Voltage fluctuations - flicker).

Always follow the existing local, national or international regulations when installing this equipment.

Acceptable voltages (±10%): 435/250, 415/240, 400/230, 380/220, 365/210, 345/200, 250/145, 240/139, 230/133, 220/127, 210/121, 200/115.

Example

435/250 refers to 435 Volts phase-to-phase/250 Volts phase-to-neutral.

- If the phase-phase voltage is 200-250 Volts (USA for instance) the machines are **Delta** connected.
- If the phase-phase voltage is 345-435 Volts (continental Europe has 400V) the machines are **Y** connected.

Disposal Requirements

Disposal of the MYDATA machine and peripheral equipment shall be undertaken in accordance with existing local, national or international regulations. Always take care of residual products in an environmentally friendly way so that release of dangerous substances does not adversely affect the environment.

Electrical equipment must **not** be thrown in the garbage can. Take the unit, accessories and packaging to an approved disposal site for environmentally friendly recycling.

Batteries consist of active chemicals enclosed in a solid housing. Therefore, improper handling can cause injury or damages. Dispose of used batteries separate from other waste. Follow the existing local, national or international regulations.

All packaging material are made from cardboard, plastic, styrofoam, or wood and it can be recycled at your local recycling center.

Installing the Placement Machine

Upon arrival the machine must be unloaded, unpacked, lifted, moved to the machine site and leveled.

☞ It is strongly recommended that a MYDATA representative is present during the installation procedure.

This section describes how to perform the installation tasks and is divided into the following main parts:

Requirements

Before commencing the installation, gather the following tools and equipment.

– Standard Tools.
– Set of metric Allen Keys and Torx keys.
– 36 and 70mm wrench (provided at delivery).
– Spirit level.
– Lifting equipment.

Unloading the Machine from the Truck

Follow the procedure described below to ensure that the unloading is safe and the machine is not damaged during the unloading.

1. If your loading dock is the same height as the transportation vehicle, use a pallet jack to unload the shipping crate from the transportation vehicle. The pallet jack should have at least 122 cm tines or forks. Follow any instructions that are printed on the packing crates.

   If your site does not have a loading dock, arrange for a forklift to unload the machine from the transportation vehicle. Ensure that two or three people are available to help unload the equipment. Move all crates slowly and carefully.

WARNING! Due to the weight of the machine, ensure that you have assistance when moving the machine. Always move the machine slowly and carefully. Roll the machine preferably with the short side in speed direction. This precaution is to prevent the machine and/or equipment from tipping over if any of the wheels suddenly should get stuck for some reason. Also do not roll the machine on a tilting plane. If this is the case, then use a fork lift to move the machine to its designated location. Also, do not roll the machine over edges from the front in backward direction. The machine should only be rolled in this direction when placing it to its final position. Failure to do so could result in serious damage to personnel and/or equipment.

2. See section *Lifting the Machine Using a Fork Lift* on page 2-15 for detailed instructions on how to lift the machine and where to position the pallet jack.

Unpacking

The machine is sometimes shipped in a wooden crate (outside Europe) and must be handled with care. If the machine is crated, then you first have to decide if the machine should be moved in its crate or if the crate should be removed first. Ensure that the crate will fit through all access doors.

It may be necessary to partially disassemble the crate before moving the machine. If its possible, keep the machine in the crate during transport.

1. If the machine is crated, ensure that the shipping crate is positioned close to its destination before you start unpacking the crate.
2. If crated, inspect the 'Shock-Watch' and 'Tilt-Watch' gages for activation and the crate for damages. These must be annotated on the Bill of Lading and goods received note.
3. Remove packaging.
   - Remove the top lid.
   - Remove the rear and front sides of the box.
   - Remove the plastic protection.
   - Do not discard the original packaging. Keep it for future relocation.
4. Remove any special bracing or brackets that may be present.

Do **not** remove the shipping brackets securing the X and Y movement systems. These brackets should only be removed when the machine has been moved to its designated location. Otherwise the positioning systems could be seriously damaged. Also, do not remove the tip over warning signs until the machine has been moved to its designated location.

---

5. Remove any tape and tie wraps securing machine parts during shipment.
6. Remove the additional packages fastened to the machine (monitor, printer, magazines, etc.).
7. Remove any transportation lock-down devices and release the machine from the bottom of the box.
8. Inventory all packages to ensure that the correct items are delivered according to the packing list. If not, contact your local MYDATA representative.

   Items that are always included:
   - Power cable.
   - Calibration board and calibration components.
   - Operator's Manual.
   - Programming Manual.
   - Software Manual.
   - Service Manual (distributed on CD).

Moving and Placing the Machine

There are basically three ways to move the MY100 machine to its final destination.

- If the shipping crate has been removed (see section *Unpacking* on page 2-11) then move the machine on its transport wheels. Use two or more people to roll the machine to its designated location.

WARNING! Due to the weight of the machine, ensure that you have assistance when moving the machine. Always move the machine slowly and carefully. Roll the machine preferably with the short side in speed direction. This precaution is to prevent the machine and/or equipment from tipping over if any of the wheels suddenly should get stuck for some reason. Also do not roll the machine on a tilting plane. If this is the case, then use a fork lift to move the machine to its designated location. Also, do not roll the machine over edges from the front in backward direction. The machine should only be rolled in this direction when placing it to its final position. Failure to do so could result in serious damage to personnel and/or equipment.

- If the machine is in its shipping crate, use a pallet jack or fork lift to move the machine to its designated location.
- *Lifting the Machine Using a Fork Lift* on page 2-15.
- *Lifting the Machine Using a Crane* on page 2-18.

Placing the Machine

The machine stand bolts fit into threaded holes in the four corners of the frame and are secured by nuts from below. The bolts have hexagon grips for the adjustment. The stand plate and bolt have a ball and cup joint to adapt to an uneven floor.

1. Use a fork lift or crane to lift the machine (see section *Lifting the Machine Using a Fork Lift* on page 2-15 or *Lifting the Machine Using a Crane* on page 2-18).
2. If you do not have access to a fork lift or crane, then you use a jack under the cross bar at the short end of the machine to lift one side at a time.
3. Place the machine on fixed supports, for instance 280 mm or higher solid wooden blocks. These supports **must** be placed under the frame of the machine (see Figure 2-6).

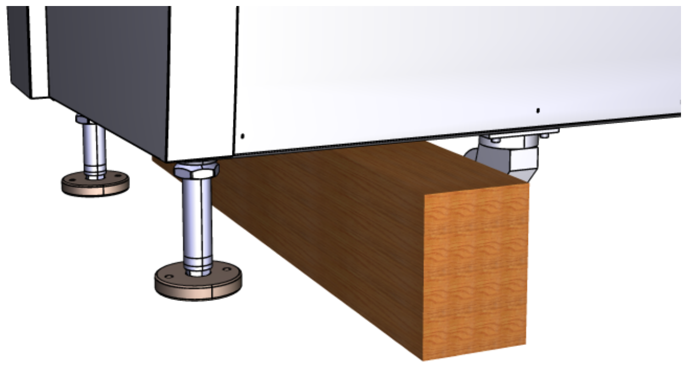


Figure 2-6. Fixed supports.

4. Remove the transport wheels and place the machine on the leveling feet.
5. If you are using a jack, then repeat the procedure on the other side of the machine.
6. Remove the tip over warning signs and store them together with the transport wheels.

Leveling the Machine

When the machine has been placed in the final location, check the leveling as described below.

1. Place a spirit level on the Y wagon or on top of the magazine tracks ('A' in Figure 2-7).
2. Adjust the leveling feet with the provided 36 mm wrench until the machine is level in both directions.

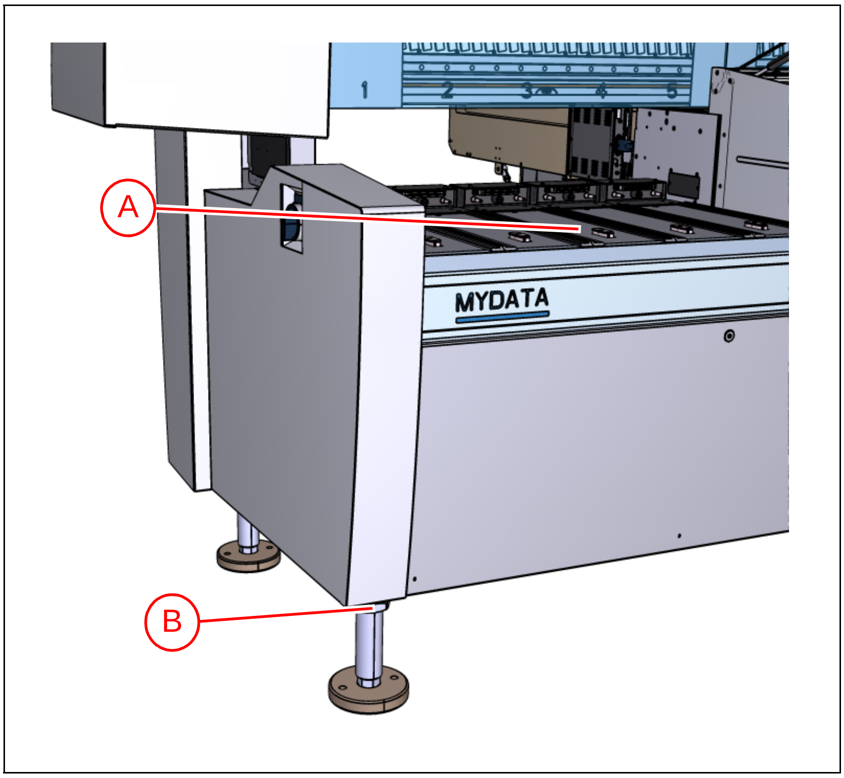


Figure 2-7. Leveling the machine.

3. Make sure that each leveling foot is screwed firmly against the floor so that the weight of the machine is divided on the four feet.
4. Check if the machine is steady by manually trying to rock the machine. If not, adjust the leveling feet.
5. Use the provided 70 mm wrench to tighten the locking nut ('B') on each leveling foot.

Lifting the Machine Using a Fork Lift

WARNING! To avoid tilting or damaging the machine. Lift the machine as described below. Otherwise, the machine may become damaged and the lifting may become dangerous.

The MY100 machine can be lifted from the front center, or from the side. Refer to the following sections for instructions.

– *Lifting at the front center* on page 2-15.

– *Lifting from the gables* on page 2-16.

Lifting at the front center

Normally, the machine can be lifted with the forks placed at the front center of the machine, see Figure 2-8. If the Y module is mounted on the machine, then its recommended to lift the machine from the front.

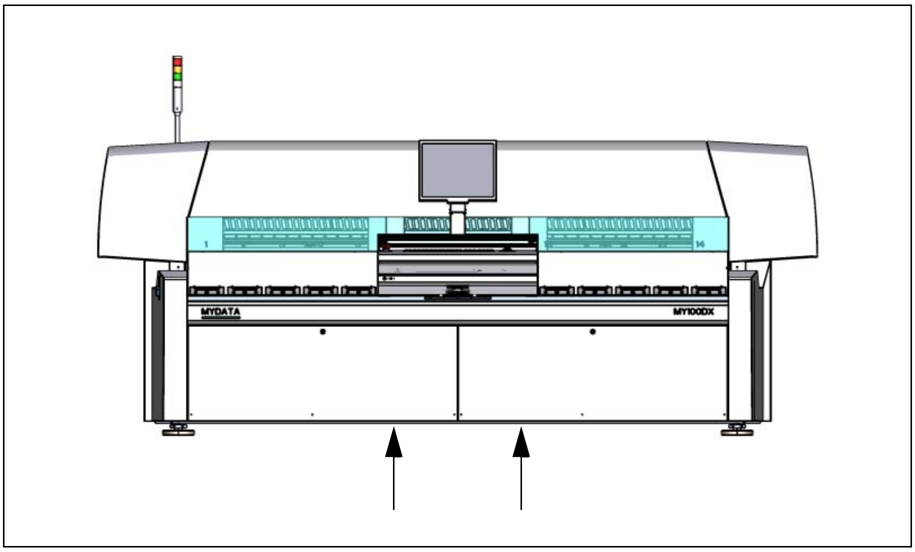


Figure 2-8. Front center lifting.

Figure 2-8 shows a MY100-14 machine, but the forks are to be placed in the center for all machines in the MY100 series.

CAUTION! Avoid excessive loading of the forks through undue inward or outward movement of hydraulically adjustable forks of the fork lift truck.

Lifting from the gables

Follow the instructions below to lift the machine from the gable. Sometimes it is necessary to lift the machine at the gables, for example when the transport wheels are to be removed or mounted (see section *Placing the Machine* on page 2-13).

CAUTION! Due to the rigid design of the machine frame, the center of gravity is ***not*** *at the exact center of the machine gable. The center of gravity is slightly shifted against the back end of the machine. The actual center of gravity is indicated by a label located at the lower end of the machine gable (see Figure 2-9).*
Be careful not to damage the power cord when lifting on the left side of the machine.

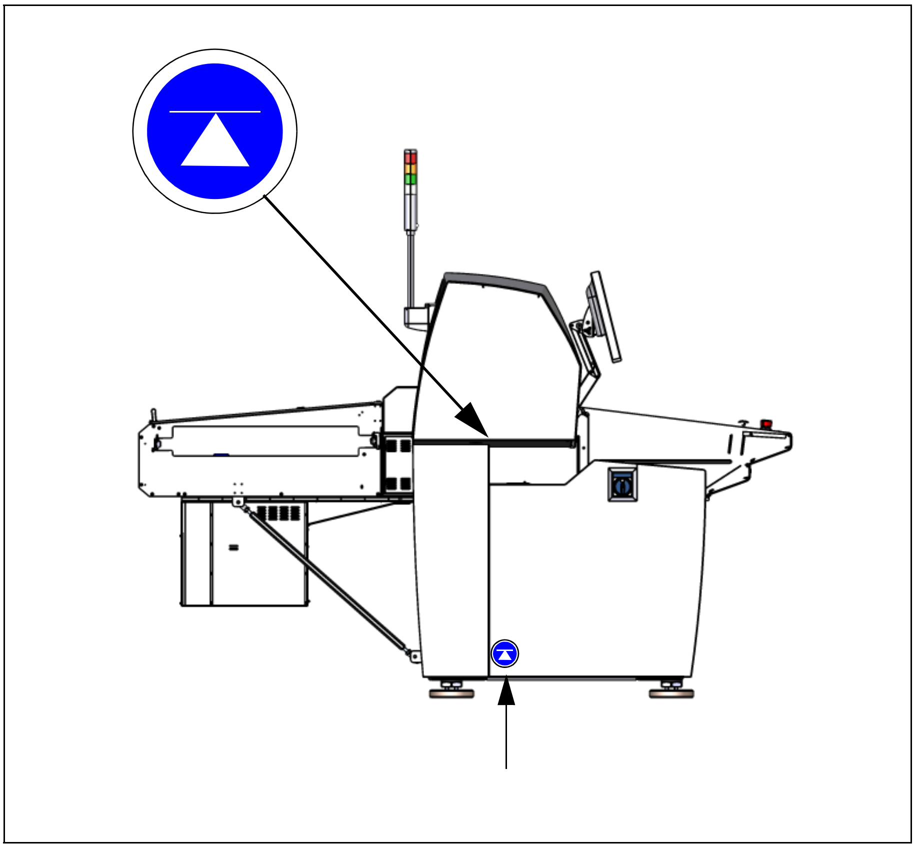


Figure 2-9. Center of gravity label.

Positioning the forks

When lifting the machine with a fork lift or a pallet lifter, place the forks as far back as possible (towards the rear of the machine). The center of gravity label should approximately be located in the middle of the two forks. See Figure 2-10.

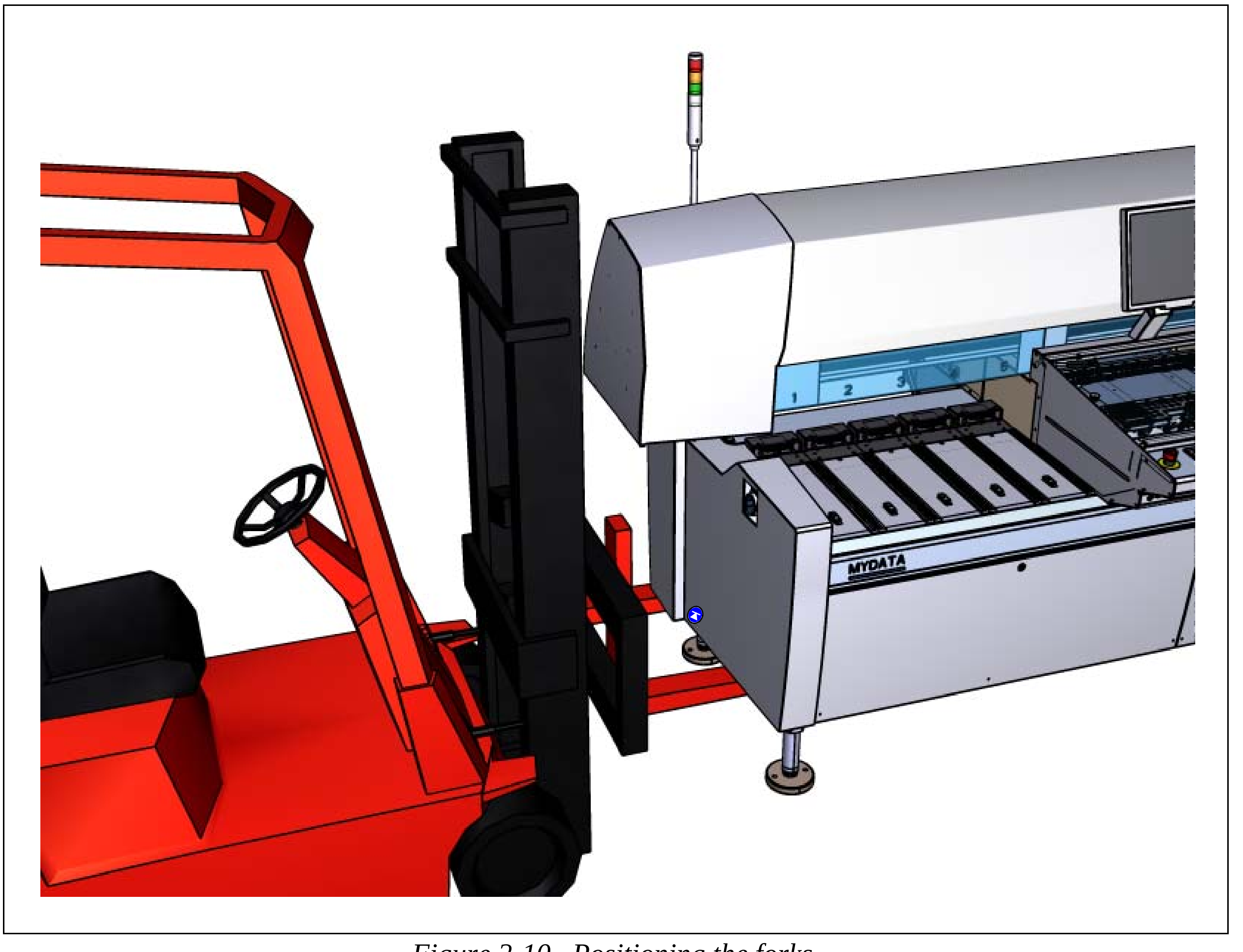
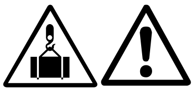


Figure 2-10. Positioning the forks.

Lifting the Machine Using a Crane

A beam with a length of 1 500 mm and eye bolts should be used when lifting the machine with a crane (see Figure 2-12).

To avoid tilting or damaging the machine, always lift the machine as described below.



WARNING! Lift the machine as described below. Otherwise, the machine may become damaged and the lifting may become dangerous.
The machine´s center of gravity is located near the rear of the machine. Therefore the hoisting cable should be slightly shorter at the rear. All cables must be routed in such a way that the machine is not damaged

Figure 2-11 shows a MY100-14 machine, but the procedure is the same for all the machines in the MY100 series.

1. Remove the front covers.
2. Fit four hoisting cables with hooks in the slots in the lower part of the machine frame. See Figure 2-11.

   There are similar slots in all four corners of the frame.

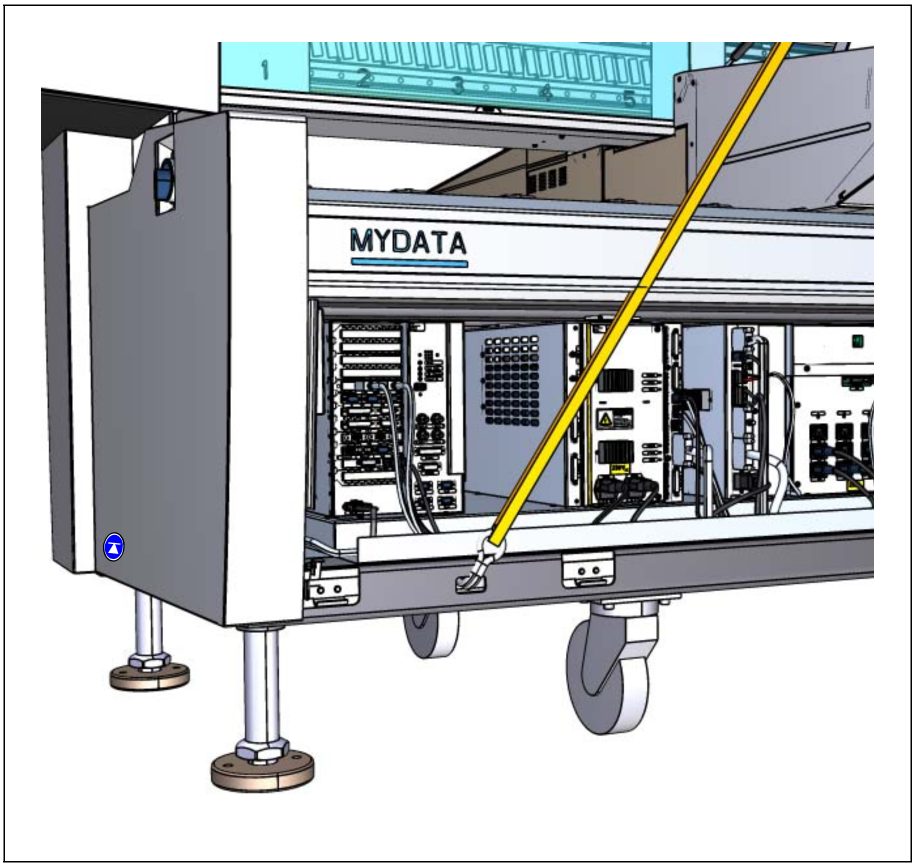


Figure 2-11. Slots in frame.

3. Fit the four hoisting cables between the eye bolts of the beam.

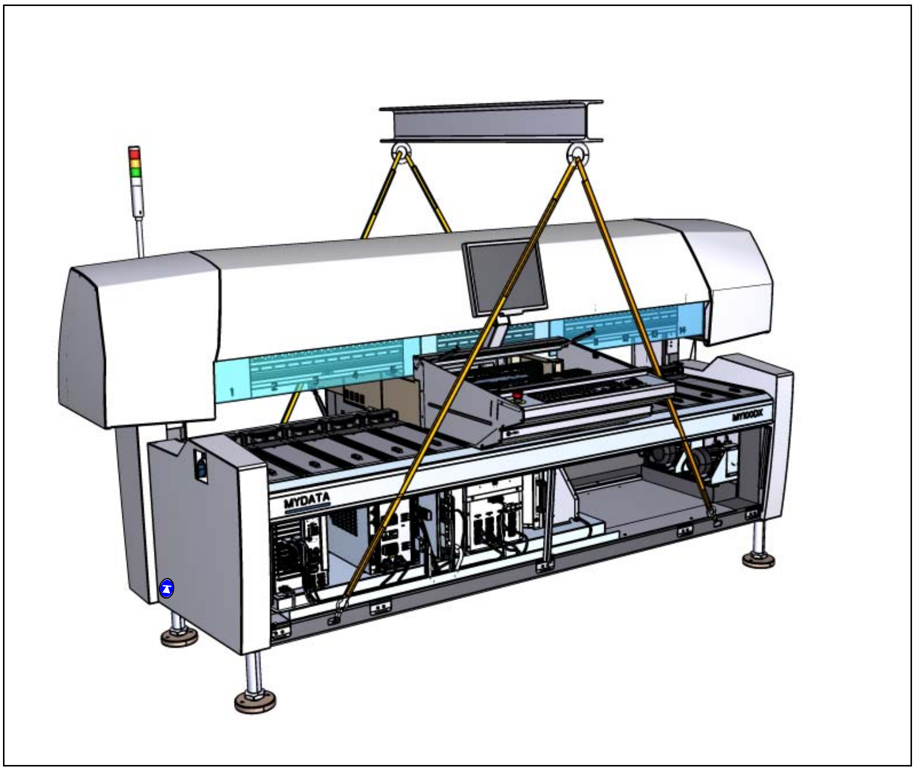
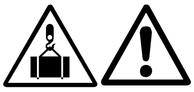


Figure 2-12. Crane lift with beam.

4. Place a piece of cardboard, or a blanket, between the machine frame and the hoisting cable. This will protect the magazine table when the hoisting cable is stretched.

Lifting the Y Module

Sometimes it might become necessary to remove the Y module from the machine table, for example if the machine needs to be moved through a narrow passage. The Y module is heavy and should be moved with a fork lift, crane or a high pallet lifter. Follow the instructions below to lift the Y module in safe manner.



CAUTION! Lift the Y module as described below. Otherwise, the Y module may become damaged and the lifting may become dangerous.
*It is **not** recommended, but the Y module could be lifted and moved by hand. Do not lift the Y module by yourself. At least two people are required to lift the Y module.*

1. Disconnect all connections from the board handling system to the machine.
2. Remove all hoods on the board handling system.
3. Remove the YBOX from the Y module.
4. Remove the conveyor from the Y module.
5. Place and secure the Y-module shuttle between the two shipping brackets that were mounted when the machine was first delivered.
6. Mount the two Y-module lifting brackets that were delivered with the machine.
7. Remove all screws holding the Y module to the machine table.
8. If the Y module is to be lifted with a fork lift or high pallet lifter then insert one of the forks in the two Y-module lifting brackets as shown in figure 2-13).
   – If the Y module is to be lifted with a crane, then the lifting brackets should be used to attach the hoisting cables.

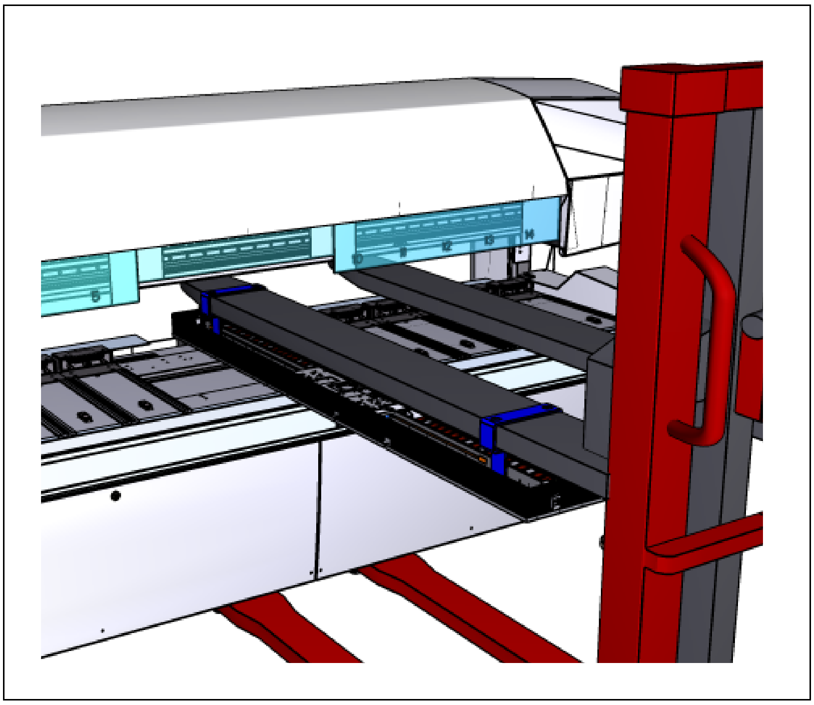


Figure 2-13. Lift with high pallet lifter.

Relocating the Machine

If the machine is to be relocated and transported follow the procedure described below to ensure that the transportation is safe and the machine is not damaged during the transport. Whenever possible, use the original packing material that the machine was first delivered in. The machine can be lifted and/or transported by fork lift truck or using a crane.

WARNING! Use of unsuitable handling equipment may result in damage to the machine. Only use handling equipment with a sufficient load-bearing capacity. Only transport the machine in the manner specified here.

WARNING! Due to the weight of the machine, ensure that you have assistance when moving the machine. Always move the machine slowly and carefully. Roll the machine preferably with the short side in speed direction. This precaution is to prevent the machine and/or equipment from tipping over if any of the wheels suddenly should get stuck for some reason. Also do not roll the machine on a tilting plane. If this is the case, then use a fork lift to move the machine to its designated location. Also, do not roll the machine over edges from the front in backward direction. The machine should only be rolled in this direction when placing it to its final position. Failure to do so could result in serious damage to personnel and/or equipment.

Requirements

Before commencing the installation, gather the following tools and equipment.

- Standard Tools.
- Set of Torx Keys.
- Spirit level.
- 36 and 70mm wrench (included at delivery).
- Lifting equipment.
- X wagon and Y module shipping brackets (included at delivery).
- Y module lifting brackets.
- If present, the machine's original packing material.

Procedure

Sometimes it might be necessary to remove the Y module from the machine table, for example if the machine needs to be moved through a narrow passage. Refer to section *Lifting the Y Module* on page 2-20 for instructions.

1. Remove all magazines, TWM (Tray Wagon Magazine), signal tower and Tex unit(s).
2. Pack all the peripheral equipment separately.
3. Mount the two provided impact protection brackets ('A' in Figure 2-14) at the bottom front slots ('B') in the machine frame.

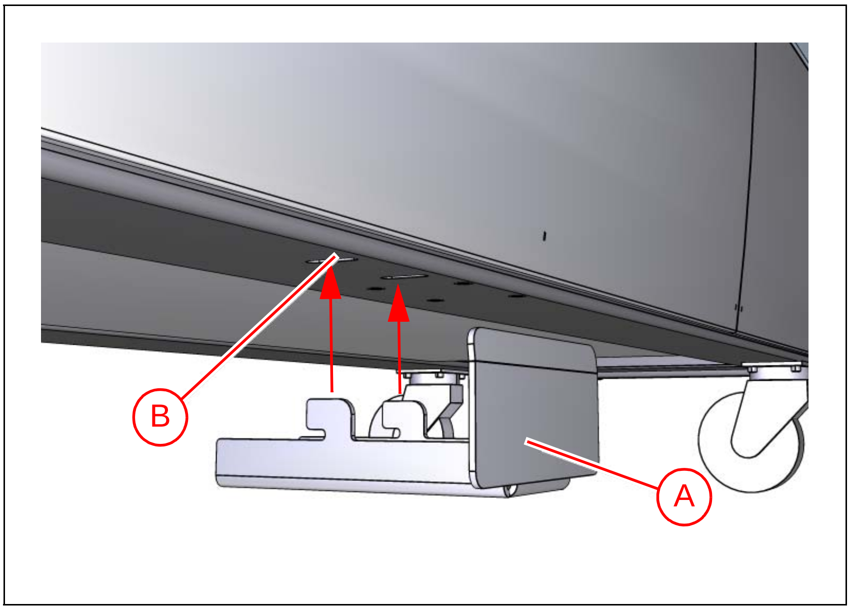


Figure 2-14. Protection plates.

4. The Y-module shuttle and conveyor must be secured with shipping brackets ('A' in Figure 2-15). Place and secure the Y-module shuttle between the two shipping brackets ('B').

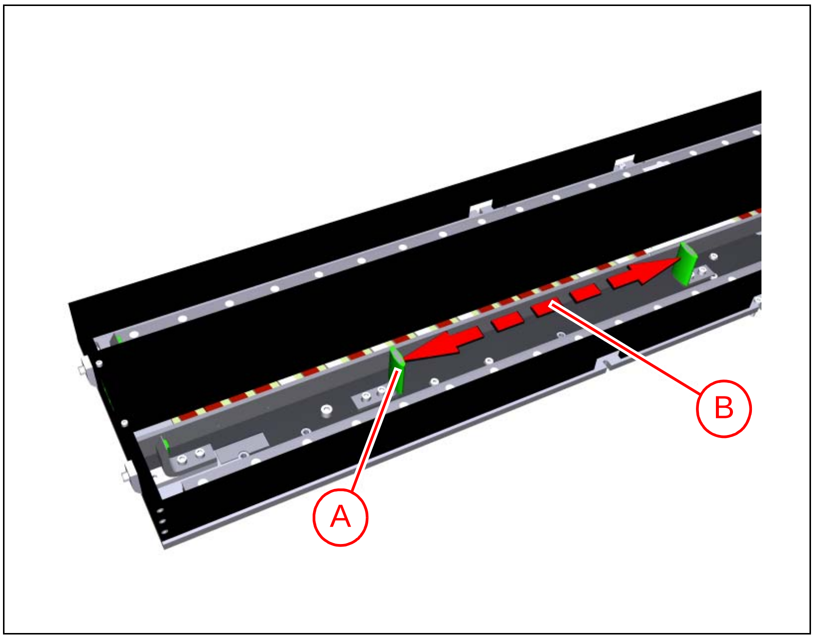


Figure 2-15. Y module shipping brackets.

5. The conveyor should be attached on top of the machine table with a special conveyor bracket (available from MYDATA).

6. The X wagons also have to be locked and secured with shipping brackets.

   Use two screws ('A' in Figure 2-16) to attach the X-wagon shipping bracket ('B') to the X beam ('C') on the machine.

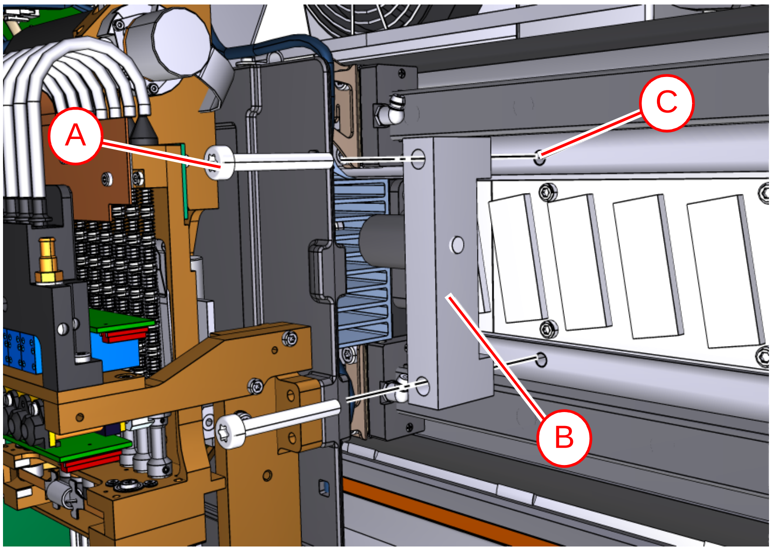


Figure 2-16. X-wagon shipping brackets.

7. If the machine has to be moved with a fork lift, crane then refer to section *Lifting the Machine Using a Fork Lift* on page 2-15 or section *Lifting the Machine Using a Crane* on page 2-18 for detailed instructions.

8. Depending on where and how long distance the machine is to be moved, it might be easier to mount the transportation wheels before moving the machine. See section *Moving and Placing the Machine* on page 2-12 for instructions on how to mount the wheels.

   If the transportation wheels are mounted, the tip over warning signs must also be mounted. See section *Moving the Machine*, figure 1-11 for information about where the sings are to be mounted.

Loading the Machine on a Truck

Follow the procedure described below to ensure that the loading is safe and the machine is not damaged during the loading.

1. If your loading dock is the same height as the transportation vehicle, use two or more people to roll the machine on to the transportation vehicle.

   If your site does not have a loading dock, arrange for a forklift to load the machine to the transportation vehicle. Ensure that two or three people are available to help loading the equipment. Move the equipment slowly and carefully.

WARNING! Due to the weight of the machine, ensure that you have assistance when moving the machine. Always move the machine slowly and carefully. Roll the machine preferably with the short side in speed direction. This precaution is to prevent the machine and/or equipment from tipping over if any of the wheels suddenly should get stuck for some reason. Also do not roll the machine on a tilting plane. If this is the case, then use a fork lift to move the machine to its designated location. Also, do not roll the machine over edges from the front in backward direction. The machine should only be rolled in this direction when placing it to its final position. Failure to do so could result in serious damage to personnel and/or equipment.

---

2. Use strong straps to secure the machine and equipment to the truck bed. The machine can be tied down to the truck bed with straps attached to the transportation wheels or the machine's leveling feet.
3. Avoid vibrations and impacts during transportation in order to prevent damage to the machine. It must be ensured that the machine is stable while it is being transported.

Powering

DANGER! The power connections should only be performed by an authorized MYDATA service engineer.
Always lock out and tag the main switch before opening the hoods and commencing any servicing within the machine.

The MY100 machine is a three phase machine. The machine can be configured for 200 to 250 V in 10 V increments, and may be connect in a Delta or Y (wye) configuration. The machine accepts 50 to 60 Hz mains frequency.

If the machine is configured in a Delta configuration and a phase is missing, the green LED in the front will still light up but it will shine weaker. Always measure the voltage to be sure.

The voltage and Y or Delta selection is done by installing a XNET2 plug ('A' in Figure 2-17) in the EPT3 unit. The EPT3 unit ('B') is located behind the lower left front cover, under the machine table.

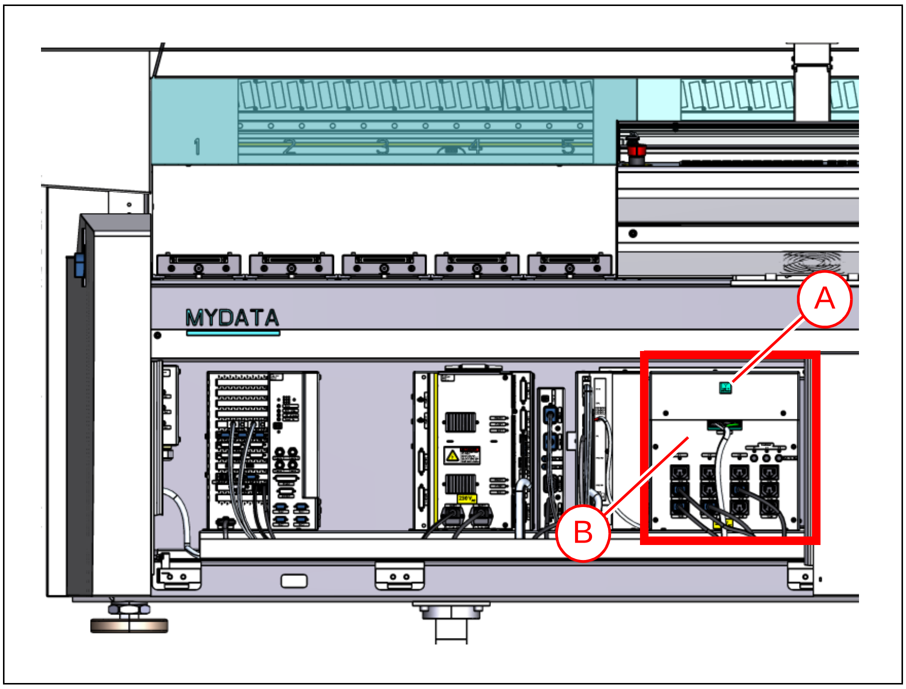


Figure 2-17. EPT3 Unit.

XNET2 Plugs

The machine is delivered with a panel that consists of six XNET2 plugs, the plugs are pre-configured to represent each possible voltage. The same plug is used for both Y and Delta configuration but is rotated 180° to select configuration.

Y configuration

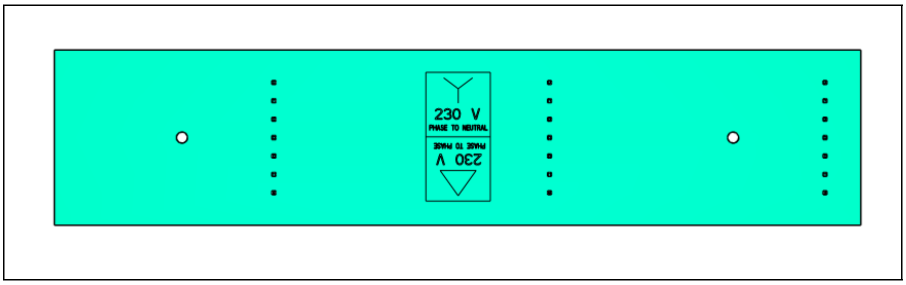


Figure 2-18. XNET2 plug (Y configuration).

Delta configuration

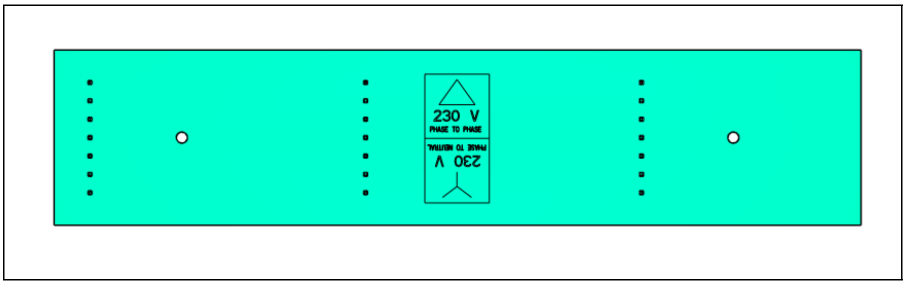


Figure 2-19. XNET2 plug rotated 180° (Delta configuration).

When delivered the machine does not have a XNET2 plug installed, so this must be done during machine installation. This procedure is detailed in the following section

CAUTION! The machine must not be put into operation until the internal temperature of the cabinet has adjusted to the ambient temperature. Otherwise, condensation could cause damage to electrical components.

Electrical Configuration

DANGER! The power configuration plugs shall only be installed by an authorized MYDATA service engineer.
Always lock out and tag the main switch before opening the hoods and commencing any servicing within the machine.

The voltage and Y or Delta selection is done by installing a XNET2 plug in the EPT3 unit.

Follow the description below to chose and install the XNET2 plug.

Requirements

- Standard tools.
- Clip-on ammeter.
- Panel with configuration plugs.
- Padlock to lock and tag the main power switch while working with the machine.

1. Turn main power switch to '0' position. Lock the main switch in this position before continuing the installation.
2. Use a standard clip-on ammeter and perform phasing on main electrical leads.
   - For a Y configuration measure phase to neutral.
   - For a Delta configuration measure phase to phase voltage.

   If the voltage varies between day and night, configure for an average value given the run hours of the machine.
3. The table below shows all possible configurations given the incoming phase to phase voltage and the phase to neutral voltage.

   Consult the table below to determine which configuration plug to use for the current installation.

Y or Delta	Phase - Neutral V	Phase - Phase V	Use XNET2 Plug
Delta	115	200	200
Delta	121	210	210
Delta	127	220	220
Delta	133	230	230
Delta	139	240	240
Delta	144	250	250
Y	200	346	200
Y	210	364	210
Y	220	381	220
Y	230	398	230
Y	240	416	240
Y	250	433	250

When configured for Y connection the three phase power system must be symmetrical, in other words the nominal voltage for the phase to neutral voltage must be the same for all three phases.

When configured for Delta connection the nominal phase to phase voltage must be the same for all phases, but the phase to neutral voltage may differ between phases.

As one example one may use the 240 Volt wild leg three phase system available in some parts of North America. In this case the machine should be set up for 240 V Delta.

4. Pry off the XNET2 plug with the correct voltage from the XNET2 plug kit panel.
5. The EPT3 unit is located behind the front left-hand base cover, under the machine table (see Figure 2-17).
6. Use a flat screwdriver to open the lock in the front left-hand base cover, remove the front cover.
7. Remove the two upper screws on the EPT3 and remove the cover ('A' in figure 2-20).

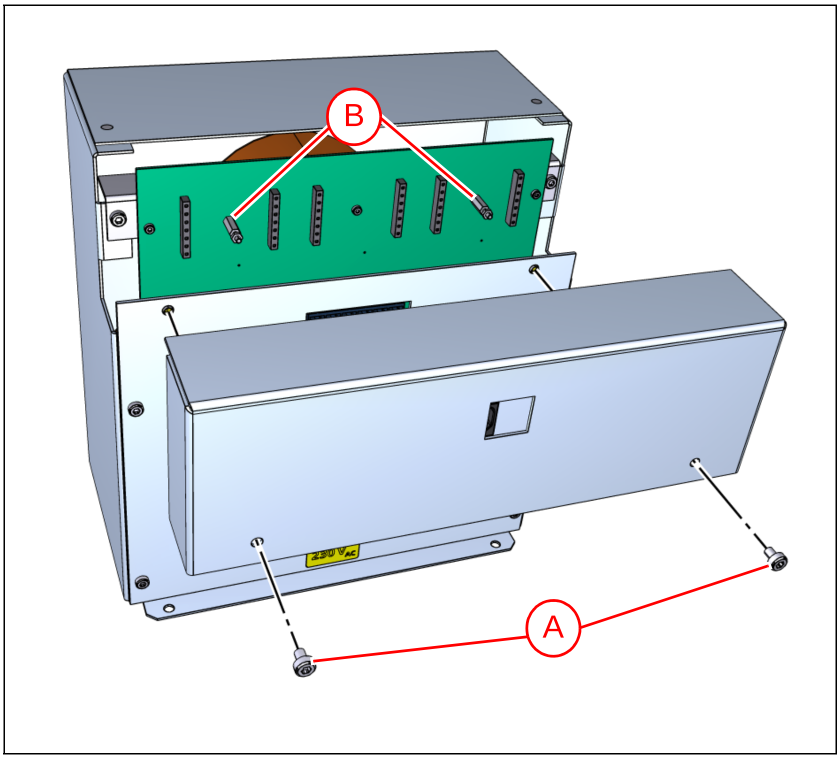


Figure 2-20. Remove cover.

8. Remove the two small nuts from the standoffs ('B').
9. Turn the XNET2 plug so that the text of desired configuration (Y or Delta) is readable (not upside down).

10. Align and connect the plug to the EPT3 with the standoffs in the holes of the XNET2 plug (see figure 2-21). Press firmly to seat the three connectors completely.

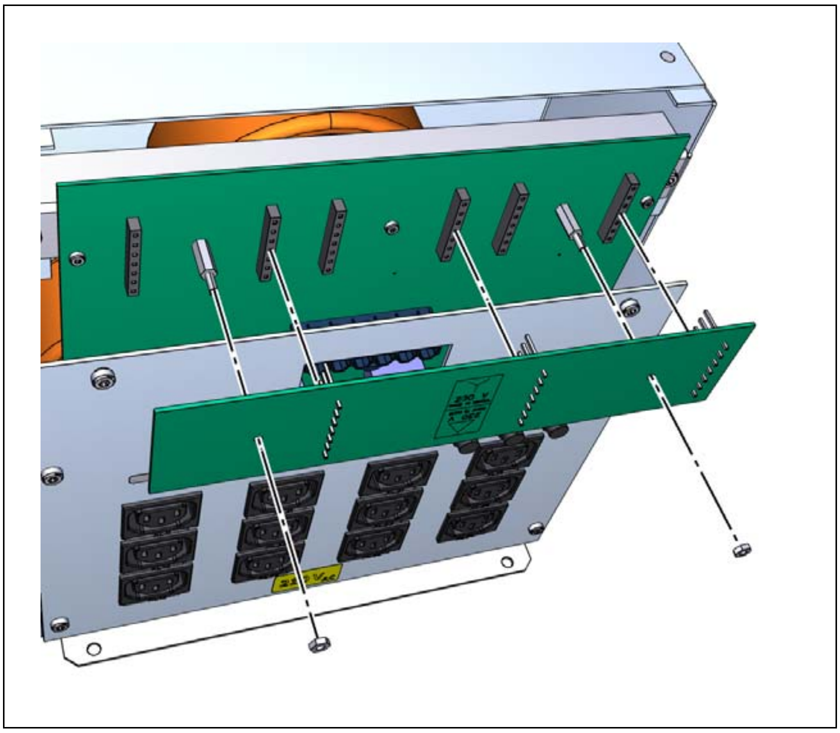


Figure 2-21. Attach XNET2 plug.

11. Secure the XNET2 plug with the two M3 nuts from the standoffs.

12. Reassemble the cover.

13. Double check voltage configuration by reading in the inspection opening in the cover. See figure 2-22

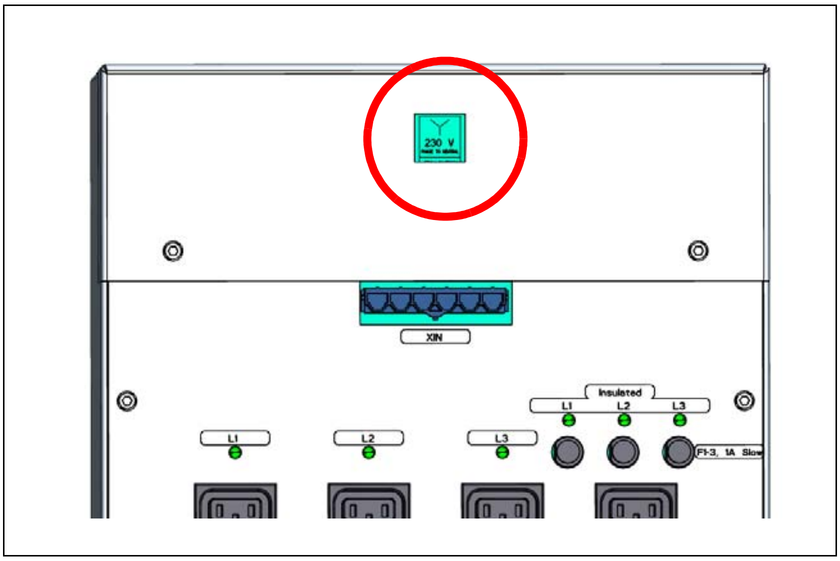


Figure 2-22. Inspection opening.

WARNING! Never connect the mains before ensuring that the correct configuration plugs are installed.

Electrical Connection

This placement machine is intended to be stationary and movable to accommodate the changing production needs of the end use factory (this is in compliance with the NEC Article 400-7 and -8).

The machine is delivered with a 5 x 2.5 mm^2 power cable to Europe and the power cord delivered to US is of type AWG12. Depending on the destination, a US 5 pole, three-phase power plug (Figure 2-23), or a European standard 5 pole, three-phase power plug (Figure 2-24). US power plug specification (Figure 2-23): NEMA L21-20P, 20A 3Y, 120/208 V AC, UL/CSA, 2HP, IP20.

Power Plug Connection

Connect the mains power plug according to Figure 2-23 or 2-24 and table shown below.

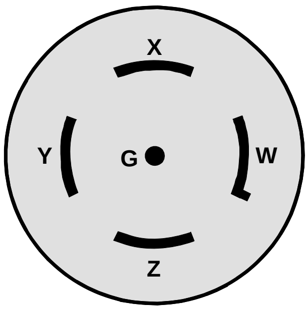


Figure 2-23. Power plug, US.

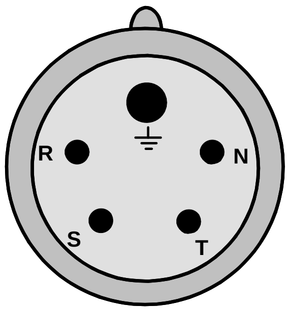


Figure 2-24. Power plug, Europe.

Figure 2-25. Power plug with cord (Europe).

Part	Power plug markings US	Power Cord Colors, US	Power plug markings EU	Power Cord Colors, EU
Live 1	X	Orange	T	Black
Live 2	Y	Red	S	Brown
Live 3	Z	Black	R	Black
Neutral	W	White	N	Blue
Protective Earth	PE	Green	W	Yellow/Green

Power Cord Connection

Follow the procedure below to connect the mains power cord to the machine's power terminal block.

1. Route the main electrical cable underneath left side of machine base and up through cutout in lower part of left gable.
2. Continue to route the main electrical cable through the cable grommet ('A' in Figure 2-26) in lower part of the power inlet unit.
3. Measure and cut the cable to appropriate length.
4. Strip the cables and connect the electrical leads to the terminal block ('B'). Refer to Figure 2-26 and the table below to determine the correct position of the leads

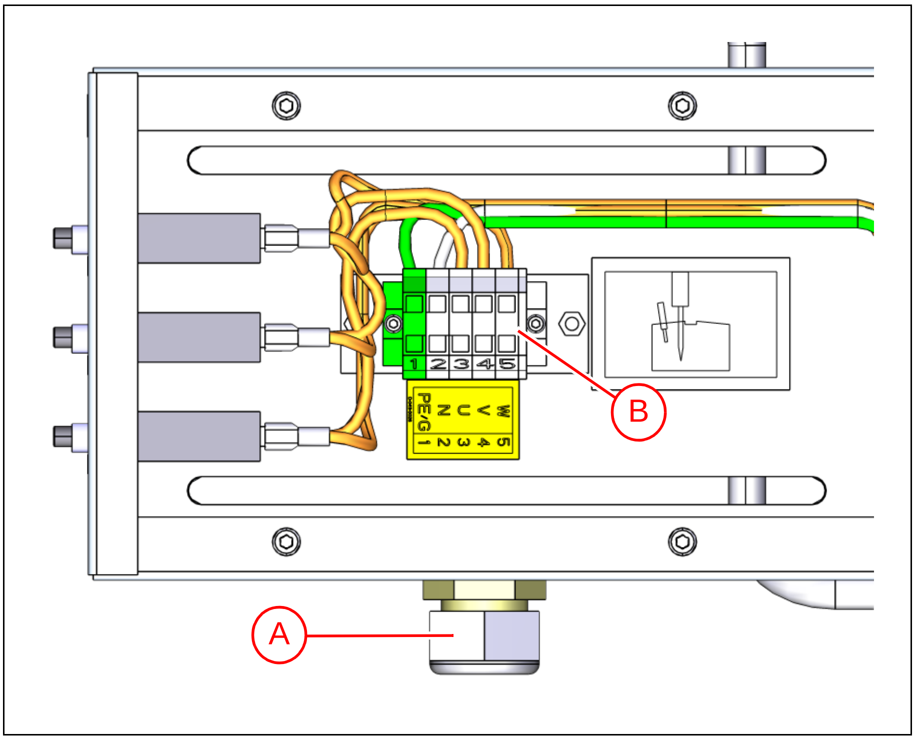


Figure 2-26. Power terminal block.

Part	Power terminal block marking	Power cord marking, US	Power cord marking, EU
Live 1	W	Orange	Black
Live 2	V	Red	Brown
Live 3	U	Black	Black
Neutral	N	White	Blue
Protective Earth	PE/G	Green	Yellow/Green

Network Connection (optional)

The machine is connected to the network via the left RJ45 connector, located in the front of the CB3 (Computer Box 3). The right RJ 45 connector is not used. See ('A' in Figure 2-27). Route the network cable the same way as the power cord.

For information on how to install and configure the network, refer to TPSys 2.9 Installation Guide.

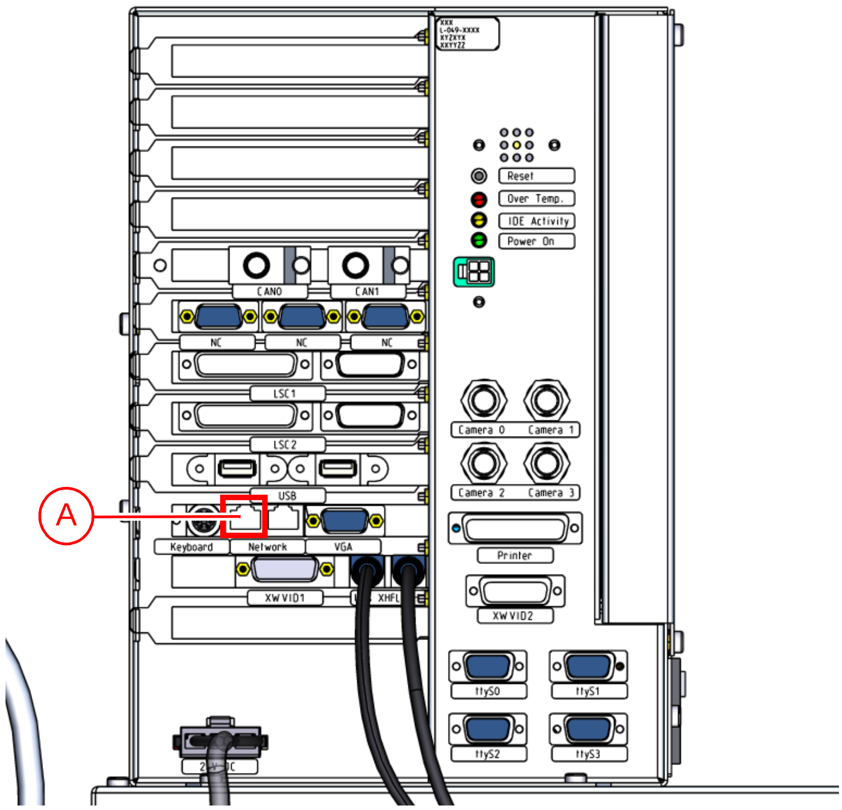


Figure 2-27. RJ45 connectors.

Machine Installation and Calibration

There are a number of installation and calibration tasks in TPSys for a complete machine installation. The system will lead you through these tasks in the correct order – all you have to do is follow the instructions on the screen. Chapter 3 details how the various subsystem's are registered in *hwconf*. Chapter 4 give information as to the tools and other hardware that is needed, as well as details on how to use calibration components and boards.

Installing External Conveyors

When putting a line together, it is important that it is aligned properly. The smallest deviation could cause board jamming. Also make sure that there is room for other units at each end of the line, such as a board loader and/or unloader unit. Normally a factory layout plan should be available.

1. Place the MY100 machine so that it aligns with the overall factory layout for the conveyor line. See section *Moving and Placing the Machine* on page 2-12 for detailed instructions on placing and leveling the machine.
2. Adjust the height of the machine so that it meets the SMEMA standard mechanical height. See section *SMEMA Standard Interface* on page 2-42.

Set Preliminary Fetch-and-Leave Pos. for T Conveyor

The Preliminary Fetch-and-Leave Pos. may be set already from the factory. Proceed with the procedure below in case you need to change the settings.

1. Open the conveyor hood lid and pull the T conveyor by hand to the rear mechanical stop. Hold it there and mark its position, see Figure 2-28 for details.

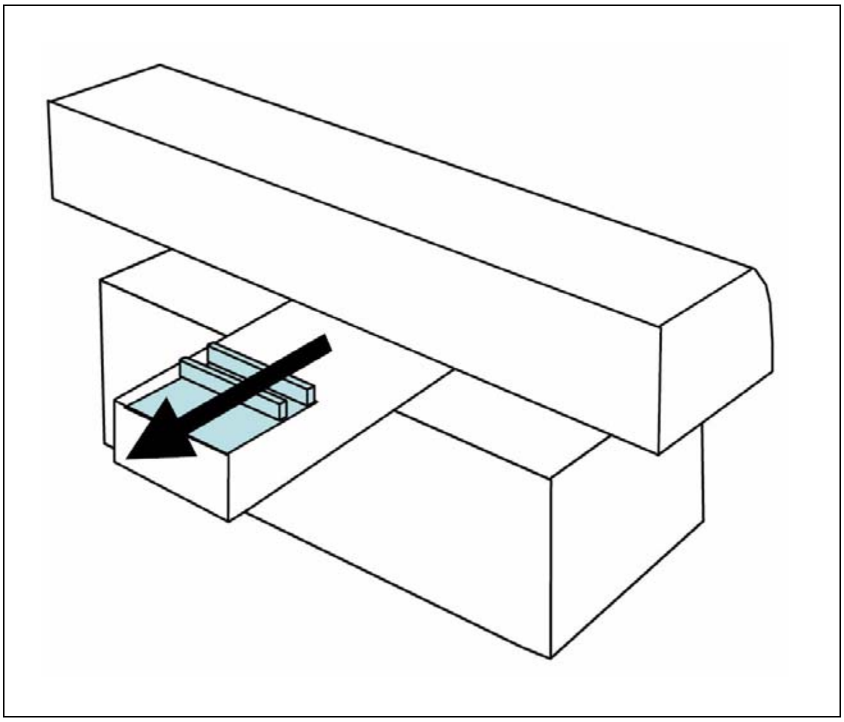


Figure 2-28. T conveyor pulled by hand towards rear mechanical stop.

2. Release the T conveyor. The magnets in the linear motor will pull the T conveyor forward somewhat. This is normal. Move it a bit further forward so that it is 34 mm, ±1 mm from the mechanical stop. See ('A' in Figure 2-29) for details. This position is the preliminary fetch-and-leave position.

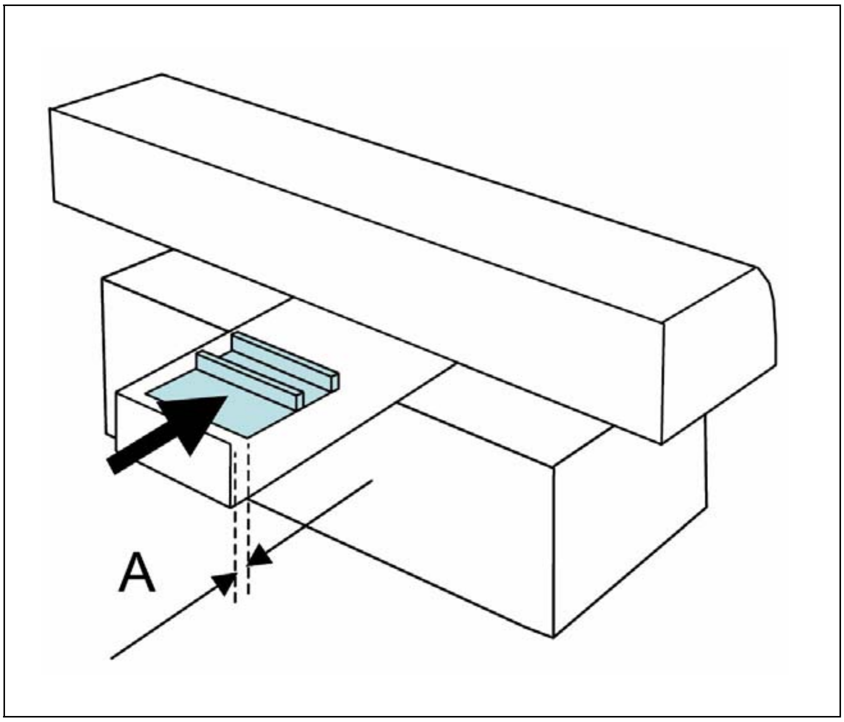


Figure 2-29. T conveyor moved forward distance A to its fetch–and–leave position.

Connect the External Conveyors to the Machine

This step includes placing the upstream and downstream conveyors next to the machine and setting up communication with the machine SMEMA interface. Two SMEMA connectors and one safety loop connector (see Figure 2-30) are located at the back of the YBOX. These connectors need to be connected to the external conveyors, and the following sections describe this procedure. Normally the external conveyors do not have a safety loop and the AUX EMERG connector on the YBOX must have a dummy plug inserted instead.

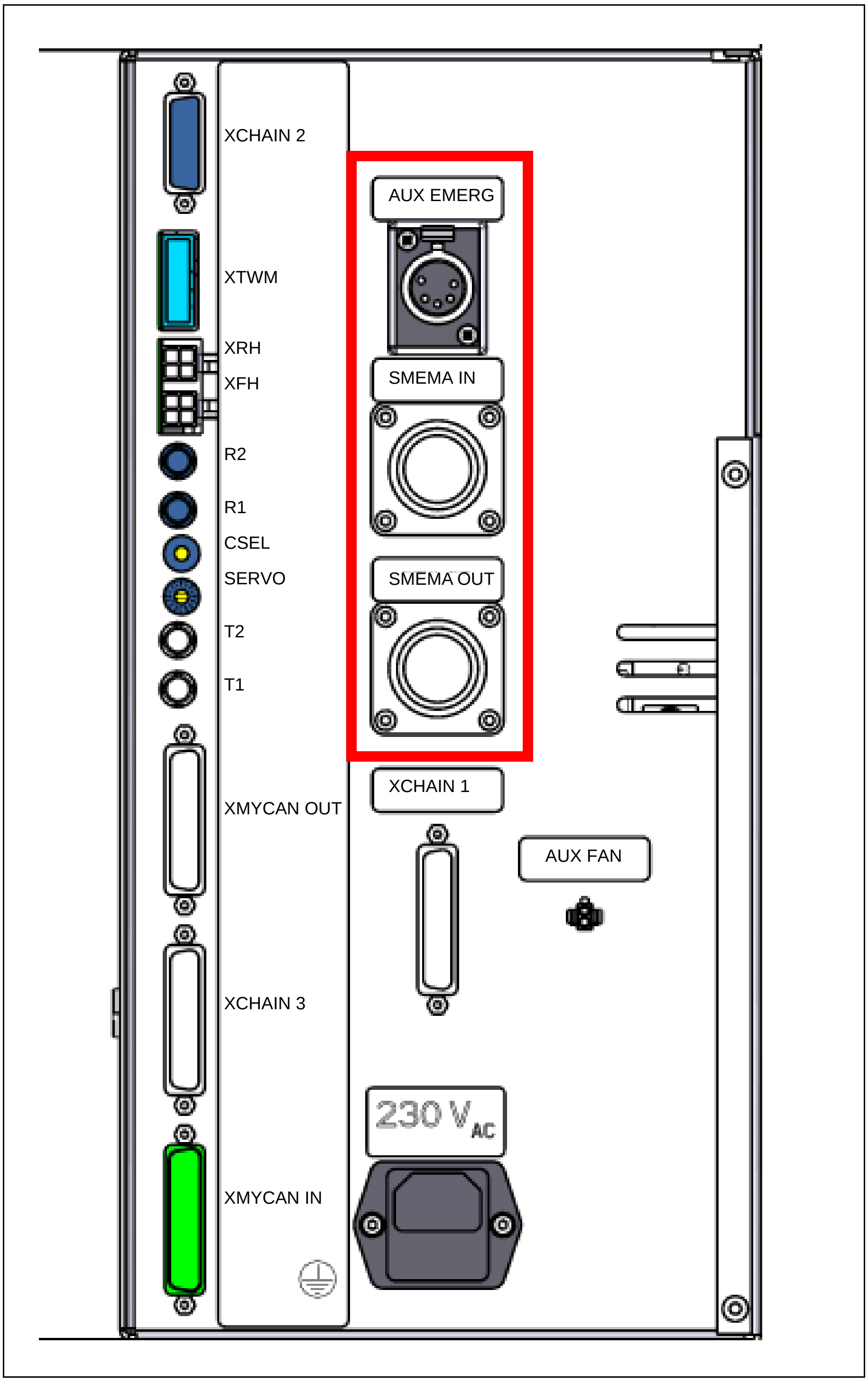


Figure 2-30. YBOX with SMEMA IN and SMEMA OUT connector.

1. Place the two external conveyors next to the machine.

   Place the upstream conveyor up-streams of the machine. The upstream conveyor is the one that is connected to, for example a board loader unit.

2. Use a SMEMA cable and connect the machine's SMEMA IN to the upstream conveyor's SMEMA OUT connector, see Figure 2-31.

3. Use another SMEMA cable and connect the machine's SMEMA OUT to the downstream conveyor's SMEMA IN connector, see Figure 2-31.

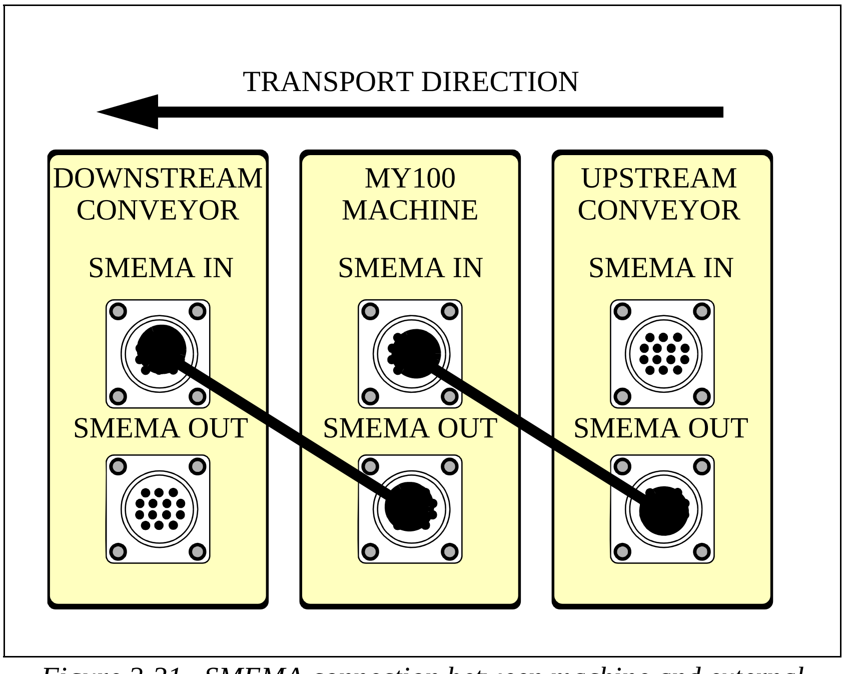


Figure 2-31. SMEMA connection between machine and external conveyors.

☞ The conveyor direction may either left-to-right of right-to-left. In both cases, the SMEMA OUT on the upstream conveyor should be connected to the MY100 SMEMA IN.

---

4. Connect the upstream and downstream conveyors to mains power.

Align the Upstream Conveyor with the T Conveyor

This procedure is very important to do carefully. It is assumed the placement machine is placed in its exact position and installed, including the T conveyor and its board edge sensors and board jam sensors, before proceeding.

The upstream and downstream conveyors need to be connected to the machine as described in the previous section.

Basically this procedure includes aligning the upstream conveyor to the T conveyor in X, Y, Z and all three angles. This alignment is standard procedure for all types of conveyor connections, but the board train puts higher demands on the precision in the alignment. Figure 2-32 shows the degrees of freedom to adjust.

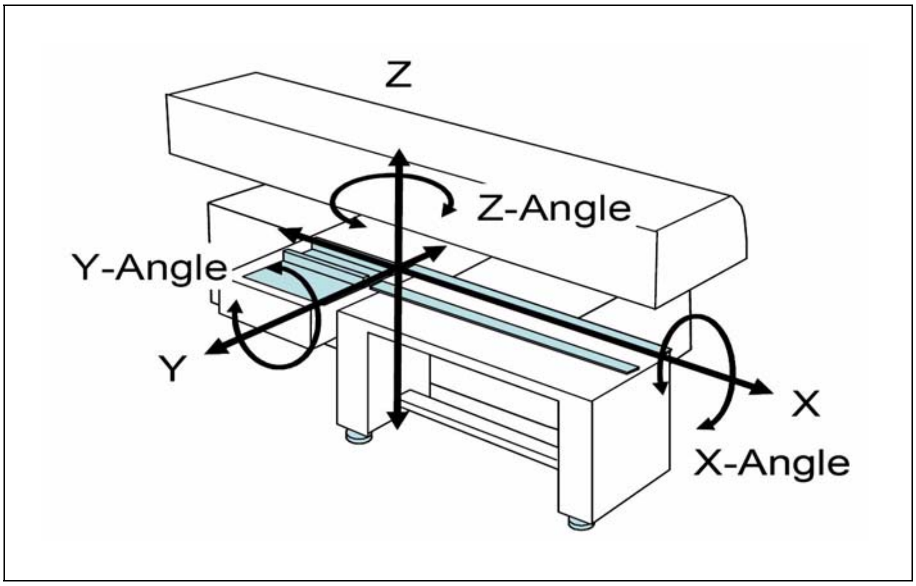


Figure 2-32. The alignment directions and angles.

There are several alternative methods to align the conveyors. All aim at getting the upstream and downstream conveyors aligned within 0.1 mm to the T conveyor, in all directions.

The upstream and downstream conveyors may include instructions for this alignment procedure. You may use those instructions, or the procedure described below.

☞ Note that the board train feature requires significantly better conveyor alignment than regular board loading.

1. Adjust the Z height of the upstream conveyor belt to within 1 mm of the T conveyor belt height. Use the adjustable feet on the upstream conveyor. Using a spirit level, make the upstream conveyor level. See Figure 2-33 for details.

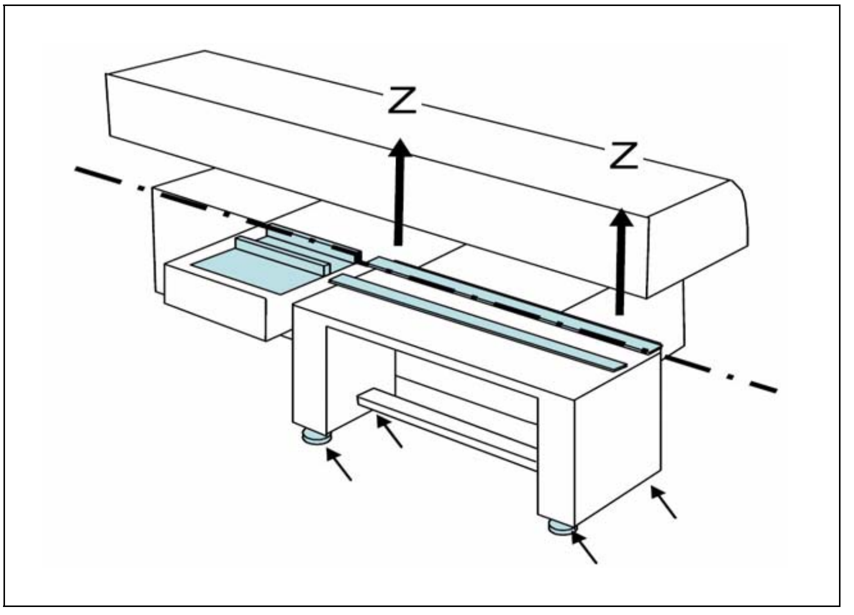


Figure 2-33. Adjust height of the upstream conveyor. Also make the upstream conveyor level using a spirit level.

2. Adjust the X gap between the upstream conveyor and the T conveyor to a few millimeters gap between the hoods. Then align the fixed rail on the upstream conveyor with the fixed rail on the T conveyor. The best tool to use is a metal ruler that is positioned on top of the conveyor belts, and then pushed against the rails. Make the alignment to within 1 mm in Y and in Z-Angle, as shown in Figure 2-34.

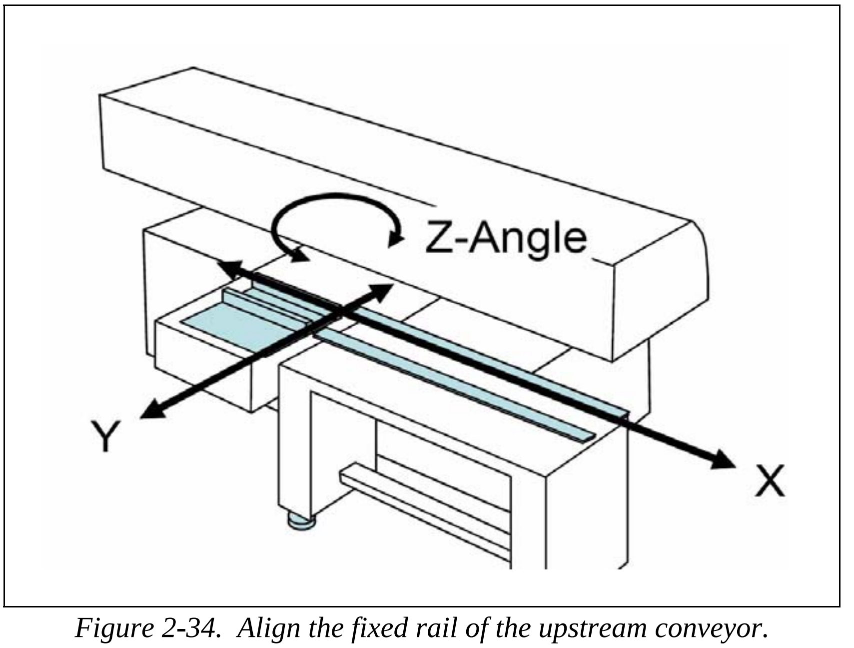


Figure 2-34. Align the fixed rail of the upstream conveyor.

3. Adjust the upstream conveyor's two feet furthest away from the T conveyor so that there is maximum 1mm Y-Angle between the upstream conveyor belt and the T conveyor belt. Use a metal ruler positioned on edge on top of the conveyor belts. See Figure 2-35 for details.

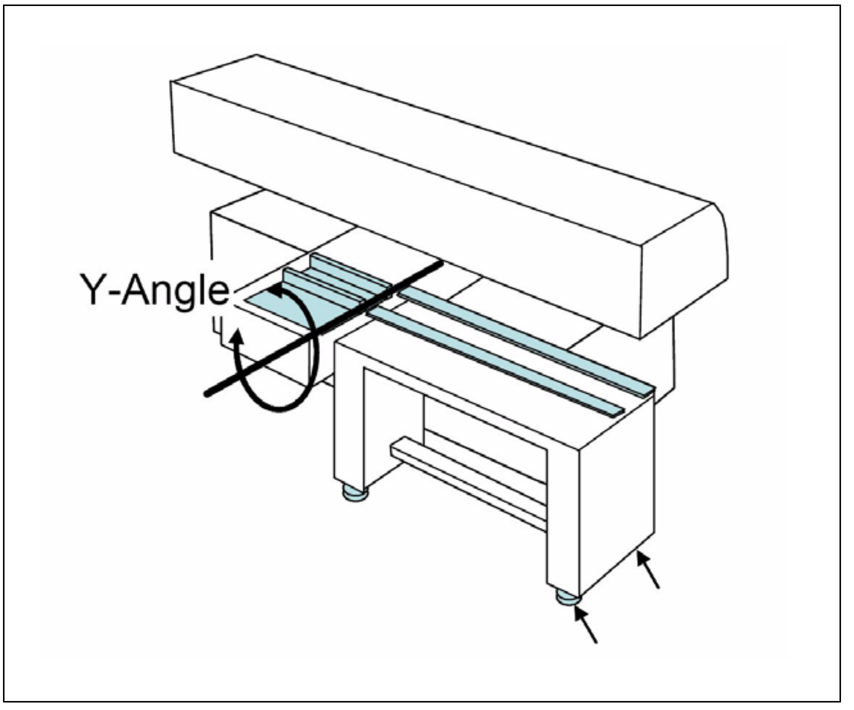


Figure 2-35. Adjust Y-Angle between upstream conveyor and T conveyor.

4. Use a long steel ruler to fine-tune the alignment between the upstream conveyor fixed rail and the T conveyor fixed rail within (0.3 mm or 12 mils) over the ruler length. At this step, only align in X and Y direction and in the Z-Angle. Instead of a steel ruler two large PCBs can be used.

5. Double-check the Z-Angle alignment in the previous step by positioning one board on the upstream conveyor and one board on the T conveyor, and make them touch each other. See Figure 2-36 for details. The gap between the boards as seen from above should be less than 0.1 mm or 4mils. If not, repeat step 4 above. Keep the boards positioned for the next step.

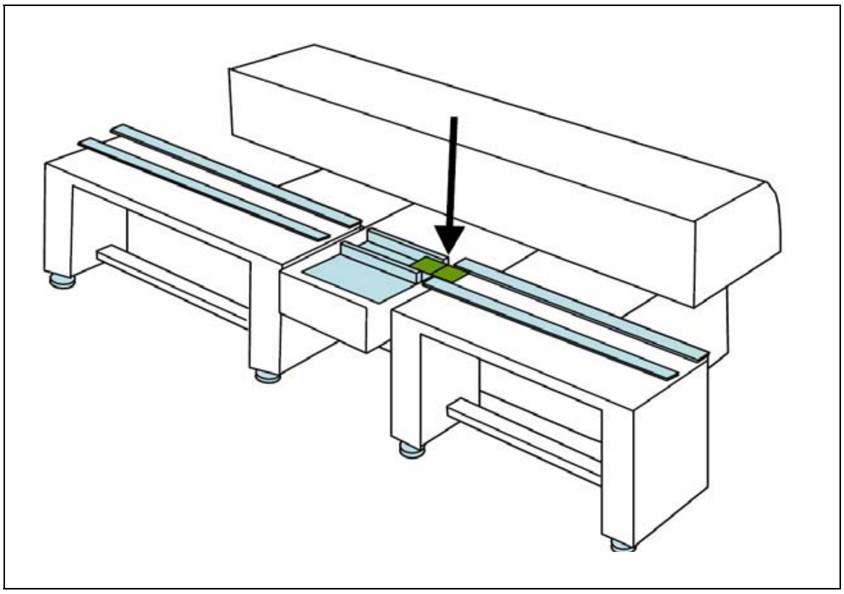


Figure 2-36. Double-check alignment between upstream conveyor fixed rail and T conveyor fixed rail.

6. Fine-tune the upstream conveyor Z height and the X-Angle as seen from along the conveyor rail by positioning one board on the upstream conveyor and one board on the T conveyor, and make them touch each other. If there is a general height difference, adjust all four upstream conveyor feet equally, either up or down. If there is an X-Angle difference, adjust either the two rear feet or the two front feet equally to minimize the angle.

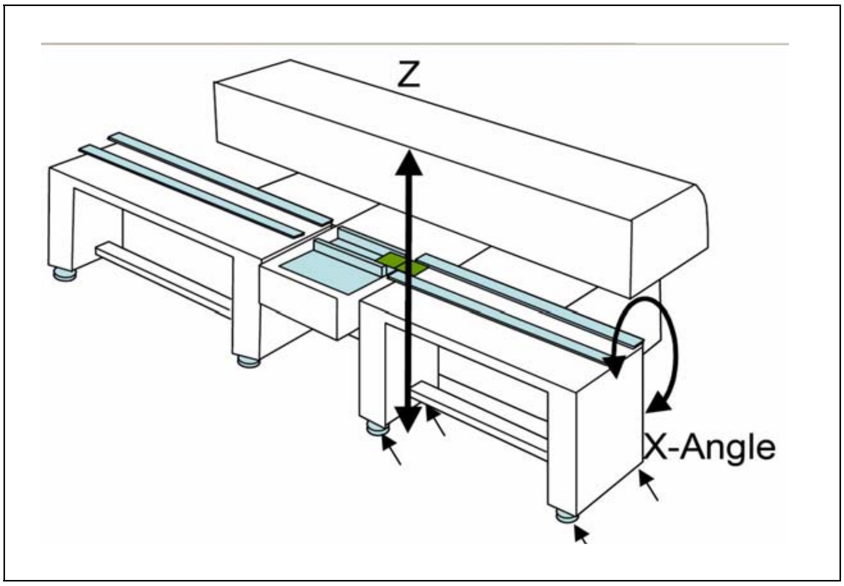


Figure 2-37. Fine-tune Z and X-Angle alignment between upstream conveyor fixed rail and T conveyor fixed rail.

7. Repeat step 4, 5 and 6 until all alignments in X, Y, Z and all three angles are within 0.3 mm over a 500 mm length.

Align the Downstream Conveyor with the T Conveyor

The procedure is similar to steps 1 to 7 of the previous section. Keep the T conveyor in the same Y position as during the upstream conveyor alignment, but without locking it fully.

1. When the downstream alignment is near finished, place a board between the upstream conveyor and the T conveyor and tighten both rails. This locks the T conveyor into its desired fetch-and-leave position. See Figure 2-38 for details.

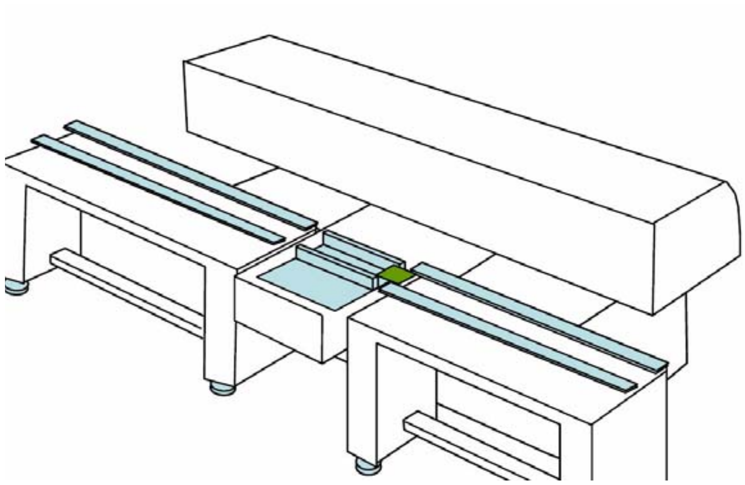


Figure 2-38. Lock the T conveyor in its desired fetch-and-leave position

2. Repeat the fine-tune alignment steps of the downstream conveyor.

   Now both upstream and downstream conveyors are aligned mechanically. Note that these alignments need to be done very carefully.

Start Production

When everything is lined up, and all parameters are adjusted, it is time to start to test the line to make sure the conveyors and the machine really work together, no boards jam etc. Enable pass through mode in TPSys and let boards of different size pass through the machine

If everything worked correctly, it is time to calibrate the machine. See Chapter 4 for details.

SMEMA Standard Interface

The conveyors and the MYDATA machine are SMEMA standardized. SMEMA is the Surface Mount Equipment Manufactures Association. They have standardized both the mechanical and electrical interface and it is called SMEMA Interface standard 1.2

If you want to read this document, please visit: www.ipc.org/html/smemastandards.htm.

The following text is extracted from the SMEMA document.

Interface Standard 1.2, Mechanical

Conveyor height: **1.** Each machine must have the transport conveyor height adjustable from 939.8 to 965.2 mm from the floor to the bottom of the PCB.

Conveyor width: **2.** For equipment with an adjustable conveyor width, the front rail is fixed and the rear rail is adjustable. The range of adjustment will vary with the equipment manufacturer.

Edge clearance: **3.** The conveyor should require no more than 3 mm of clear board space at the side edges.

Maximum gap: **4.** The maximum gap between the in-line machine track ends is 9.5 mm.

Lead-in: **5.** The minimum lead-in on the track ends of the conveyor is 3.1 mm.

Interface Standard 1.2, Electrical

There is also a standard for the electrical interfaces between machine of different manufactures.

The logic is as follows:

1. Board transfer occurs when machine A has a Board available (contact closed), and machine B is Not busy (contact closed).
2. The signal BA/NB can occur at anytime, but board transfer does not occur until both contacts are closed.
3. The Board available signal from machine A will remain closed until the board has left machine A.
4. The Not busy signal will remain closed until the board has arrived at machine B.
5. Board transfer cannot occur again until each signal opens for at least 50 ms.
6. Optional: Once both machine A and machine B signals are closed, and the board has neither left A nor arrived at B, an error message will be generated.

3. Hardware Configuration

TPSys has a hardware configuration program called *hwconf*. This is where the machine configuration is specified.

There are two main tasks for the program:

– Identification of the servo controllers present in the machine, and thus select the appropriate servo software for them.

– Configuration of machine parameters, given the installed hardware.

Hwconf must be run every time the hardware is changed, or TPSys is upgraded. When you run hwconf for the first time, you must perform the operations described below manually. This is also the case if you add, or remove, hardware on the machine. When upgrading TPSys on the other hand, the program will perform these steps automatically.

TPSys View Of the Machine

TPSys sees the machine as a set of units, or subsystems. Each subsystem is configured by selecting the appropriate module type, which is an actual physical implementation of the subsystem. If there are more than one module type available, the operator must point to the correct one.

TPSys can communicate with some of these subsystems. To communicate, the system uses a number of controllers, or servo boards. The hwconf program automatically detects the various controller types on the machine.

Starting hwconf

1. Exit TPSys if it is running.

2. Start the configuration program `hwconf` at the Linux prompt on a machine. This opens up a TPSys-like interface with only two menus, *Main* and *Exit*.

The *Main* menu in the hwconf program has two options, *Controllers* and *HW Configuration*. These options are described below.

Controller Viewer Window

Select *Main* > *Controllers* in the hwconf menu to open the *Controller Viewer* window.

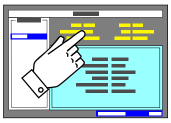
This window is primarily used for troubleshooting of servos and for installing special servos.

Command Keys

All available commands for the *Controller Viewer* window are found in the upper-right area of the window.

Commands that are common in the TPSys interface are described in the TPSys, Operator's Manual.

Commands that are specific to the *Controller Viewer* window are listed below.



Enter– Autodetect Controller

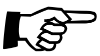
Highlighting a controller in the list and pressing <Enter> starts a search for that specific controller.

F1 – Auto-detect all Controllers

Pressing <F1> starts a search for all controllers in the list.

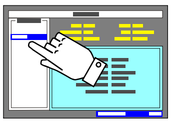
F2 – Select special servo

It is possible to bypass the automatic selection of servo for a controller and selecting a special servo. Press <F2>, and a list of available servos for the controller will appear.



There is no check that the servo selected is valid for the machine or configuration.

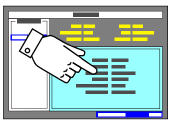
Controllers



The *Controllers* list shows the possible controllers for the current machine, and the status of detection. A status symbol at the left of each entry shows the current status. When the window is first opened, no symbols are shown.

Symbol	Status
	No symbol means no search has been made for that controller type.
–	Searched for but not found.
*	Searched and found.

Data



This box contains detailed information about the highlighted controller, for instance servo software name, version and date.

Subsystem Viewer Window

Select *Main* > *HW Configuration* in the hwconf menu to open the *Subsystem Viewer* window.

This will bring up a list of possible subsystems in the machine. When configuring a new machine, mandatory subsystems and the centering unit are preselected. You may need to manually add some subsystems, depending on the configuration. If an old machine configuration exists, for instance when TPSys is being upgraded, this existing configuration is read.

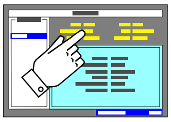
If the system has not auto detected the controllers before you configure a subsystem, it will perform an automatic detection. This may take a few seconds.

Command Keys

All available commands for the *Subsystem Viewer* window are found in the upper-right area of the window.

Commands that are common in the TPSys interface are described in the TPSys, Operator's Manual.

Commands that are specific to the *Subsystem Viewer* window are listed below.



Space – Select subsystem

By pressing <Space> when a subsystem is highlighted, you toggle whether the subsystem should be present or not. The *Present* field in the *Data* box indicates the status for the highlighted subsystem. Note that you cannot toggle the presence of mandatory subsystems.

Enter – Configure subsystem

By pressing <Enter> when a subsystem is highlighted, you start a configuration wizard for that subsystem and for any subsystems related to that subsystem.

F1 – Configure selected subsystems

By pressing <F1> the program will configure all selected subsystems, in other words the subsystems marked with * or ** in the list (see page 3-4).

F2 – Save machine configuration

By pressing <F2> the configuration is saved. This performs all the required setup for the machine, setting the appropriate parameters and such. If you exit the window without saving with <F2>, the system will prompt if you wish to save the configuration.

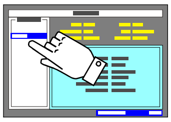
F3 – Select all subsystems

By pressing <F3>, all subsystems are selected.

F4 – Mark subsystem replaced

By pressing <F4>, the highlighted subsystem is marked as un-calibrated in the *Utility* > *Installation and Calibration* > *Calibration* function in TPSys.

Subsystems



This list contains the possible subsystems for the machine.

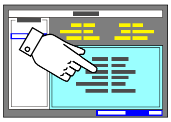
The configuration status is shown in the left margin of the *Subsystems* list. A status symbol at the left of each entry shows the current status.

Symbol	Status
	Not present.
*	Present but not configured.
**	Present and configured.

To configure a system, highlight it in the *Subsystems* list and press <Enter>. A message box will inform that auto detection is ongoing, this may take some time. Depending on the subsystem, you may get further configuration questions. For further information, see page 3-5.

If the configuration is successful, the subsystem will be marked as present and configured in the list.

Data



The data box at the bottom right shows the status and, if configured, the selected module type.

Configuration Settings

When you are configuring the subsystems, the system will ask a number of questions. The actual questions will depend on which subsystems are marked as present, and what machine type it is.

If the machine has previously been configured with hwconf, the program will point out the choices previously made. The questions will differ somewhat depending on machine model.

Y Wagon

The program will ask for the type of Y wagon installed.

Conveyor

The program will ask what type of conveyor is installed on the machine.

X-wagon camera

You will be asked for the kind of X-wagon camera (PVC) installed. The list below shows the different types. Some of the options are only available on some machine models.

PVC 4

Small black lighting unit with 2 halogen bulbs.
SONY-camera XC-ES30CE. FOV 14 x 11 mm.

PVC 4

Small black lighting unit with 2 halogen bulbs.
SONY-camera XC-ES30CE. FOV 16 x 12.5 mm.

PVC 5

LED light camera for DX/SX/LX machine models (L-012-0946).
Module type: L-12-946.

PVC 5

LED light camera for Low Y machine models (L-012-0946).
Module type: L-12-946_22.

PVC 5

LED light camera for HX machine models (L-012-0943)
Module type: L-12-943.

Optical centering cameras

The optical centering camera subsystems are automatically configured as follows.

Optical centering camera 1.

Always configured to SVC 1.

SVC (Standard Vision Camera) with a field of view of approximately 53.4x41.5 mm. The illumination unit is equipped with surface mounted diodes.

Optical centering camera 2.

Always configured to HRC 1.

HRC (High Resolution Camera) with a field of view of approximately 17.3x12.9 mm. HRC is always a part of the DVC (Dual Vision Camera) together with an SVC.

Optical centering camera 3.

Always configured to SVC 2.

Optical centering camera 4.

Always configured to HRC 2.

Linescan camera

The program will ask whether the installed Linescan camera is equipped with Front Light or not.

HYDRA reference background

The program will ask what type of HYDRA reference background the machine has.

Depending on machine model the HYDRA unit can be fitted with three different reference backgrounds (HRB): type 14, type 14LSC and type 28LSC.

- Type 14 can only be used with the HYDRA camera.
- Type 14LSC can be used with both the HYDRA camera and the Linescan camera. Type 14LSC has an inner diameter of 14 mm.
- Type 28LSC can only be used with the Linescan camera. Type 28LSC has an inner diameter of 28 mm.

Calibration and updating questions

Before commencing any calibration procedures, the *autoInstall* procedure should be performed as described in TPSys *Installation Guide*.

Calibration may be done at this time, or skipped for the time being. If you skip the calibration, a warning will be displayed, informing that the calibration should be performed before running the machine the next time.

You may be asked if any TEX units are installed. If there are, the program will check whether their firmware needs updating, and if necessary, update it. This may take a couple of minutes.

The program will automatically search for other controllers with firmware that needs updating, and if it finds any, it will update them also.

Messages will be displayed to inform you about the progress during this time.

4. Installation and Calibration

The machine configuration is specified in the hardware configuration program *hwconf*, see Chapter 3. Hwconf must be run every time the hardware is changed, or TPSys is upgraded.

Running hwconf is just the first step in the installation process. The next step is to let TPSys install and calibrate the various resources. Thereafter the machine is ready to use.

The TPSys *Installation Guid*e describes how to perform a complete installation of Linux and TPSys.

This chapter is divided into the following sections:

Installation

When performing a new software installation there are a couple of measurements and configurations that have to be done before the machine is ready for operation.

The following steps have to be performed before the machine can be used. Each step is described in the following section.

1. Install the TPSys software.
2. Run the *Postinstall* program.
3. Run the *hwconf* program (hardware configuration program).
4. Run the *Autoinstall* procedure.
5. Perform the machine calibration procedures.

Installing the TPSys Software

The TPSys software is installed by inserting the TPSys software CD in the machine's DVD player and powering up or rebooting the machine. Follow the instructions on the screen.

For a more detailed description of the TPSys software installation, refer to the TPSys *Installation Guide.*

Postinstall Program

Postinstall is an option configuration program that is used to set different software options, for example magic word, use time lock, tools used in the machine, colors used, network parameters. The *postinstall* program is automatically started after the TPSys software installation. It is also possible to start the program by typing *postinstall* at the Linux prompt.

Note, if you start postinstall on an already installed and calibrated machine all settings will be reset and a complete machine installation has to be performed.

For a detailed description of the *postinstall* procedure, refer to the TPSys *Installation Guide.*

Hardware Configuration Program

The machine configuration is specified in the hardware configuration program *hwconf*. The *hwconf* program must be run every time the hardware is changed, or TPSys is upgraded.

For a detailed description of the *hwconf* program, refer to Chapter 3 in this manual.

Autoinstall Procedure

Before actual use of the machine, some machine parameters must be measured in every individual machine. The measurement procedure is assisted by a program called *autoInstall*. Some of the steps will require manual intervention. Follow the instructions given on the screen.

WARNING! Not all of the normal safety systems of the machine are in operation during this procedure, so make sure that nothing is in the way of the machine's moving parts before pressing <Enter>, <PgDn> or <PgUp>.

For a detailed description of the *autoInstall* procedure, refer to the TPSys *Installation Guide.*

Machine Calibration

The final step is to perform a number of calibration procedures on the machine, thereafter the machine is ready to be used.

The machine calibration procedures are described in the following section.

Calibration

If you are to perform a new installation of a machine. Start by following the first six steps as described in the TPSys *Installation Guide*. When done, return to this section for detailed descriptions of each calibration step.

If you are not performing a new installation of a machine but new hardware has been added or replaced in the machine, then TPSys must first be informed about which calibration steps need to be performed. Before starting any calibrations, inform TPSys about the new hardware by running the *hwconf* program and select the new hardware in *hwconf*, see Chapter 3.

TPSys use calibration components and plates in some of the operations. You will be asked to locate and verify, for instance, fiducial marks on these components. In some cases you may have to do mechanical calibrations, like for instance the different camera's alignment in Y direction.

CAUTION: The calibration plate's and calibration components are the camera's absolute reference and should therefore always be handled with care. When not used the calibration plate should be stored in its accompanying casing in order to keep it clear from dust and in good shape.

Backup and Restore

When performing a backup, the calibration status of the machine as well as the calibration data created by the calibration operations are saved. Restoring will restore the calibration status of the machine.

Requirements

In order to be able to perform the calibrations, there are some hardware and tools that are needed. Before starting any calibration steps, ensure that you have the required parts at hand.

- Calibration components and plates.
- Slide caliper.
- Allen and Torx keys.
- Screwdrivers
- Spanners
- Metal ruler.

Starting the Calibration

Knowing the dependencies between various installation operations, and in which order to perform them, can be difficult. TPSys will help you with these tasks. Simply put – follow the instructions on the screen.

To start the machine calibration, select *Utility* > *Installation and Calibration.* This opens a *CALIBRATION* window listing all calibration steps.

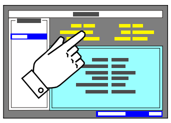
The following calibration / measurement procedures are described in this chapter.

Calibration / Measurement	Machine Model	Page
Calibrate the vacuum system	SX/DX	4-8
Calibrate the left side vacuum system	DX	
X-beam reference shape calibration	SX/DX	4-8
X-wagon camera 1 calibration	SX/DX	4-9
X-wagon camera 2 calibration	DX	
Coarse measurement of Z-unit offset	SX/DX	4-13
Place area calibration	SX/DX	4-14
X-wagon camera 2 offset calibration	DX	4-15
Coarse measurement of Z-unit 2 offset	DX	4-13
Measure Z2 length	DX	4-16
Z-unit offset	SX/DX	4-17
Z-unit 2 offset	DX	
Mount tool offset calibration	SX/DX	4-18
Mount tool offset 2 calibration	DX	
Centering Base Level measurement	SX/DX	4-19
Centering 2 Base Level measurement	DX	
Mechanical centering unit alignment	SX/DX	4-20
Mechanical centering 2 unit alignment	DX	
Cable resistance measurement	SX/DX	4-21
Cable resistance measurement 2	DX	
Optical centering HRC camera 1 illumination	SX/DX	4-22
Optical centering HRC camera 2 illumination	DX	
Optical centering standard camera 1 illumination	SX/DX	
Optical centering standard camera 2 illumination	DX	
Optical centering HRC camera 1 calibration	SX/DX	4-25
Optical centering HRC camera 2 calibration	DX	
Optical centering standard camera 1 calibration	SX/DX	
Optical centering standard camera 2 calibration	DX	
Z-unit theta calibration	SX/DX	4-28
Z-unit 2 theta calibration	DX	
Linescan camera 1 calibration	SX/DX	4-29
Linescan camera 2 calibration	SX/DX	

Calibration / Measurement (Continued)	Machine Model	Page
Optical centering HRC camera 1 offsets	SX/DX	4-31
Optical centering HRC camera 2 offsets	DX	
Optical centering standard camera 1 offsets	SX/DX	
Optical centering standard camera 2 offsets	DX	
Linescan camera 1 offsets	SX/DX	
Linescan camera 2 offsets	SX/DX	
Linescan camera 1 fine tune	SX/DX	4-32
Linescan camera 2 fine tune	SX/DX	
Align HYDRA camera X/Y	LX	4-33
Coarse adjust HYDRA tool offsets	SX/DX	4-34
Measure HYDRA tool lengths	SX/DX	4-35
Align HYDRA reference background	SX/DX	4-36
Measure HYDRA camera Z level	LX	4-37
Calibrate HYDRA camera optics (coarse)	LX	4-38
Coarse adjust HYDRA 2 tool offsets	DX	4-34
Measure HYDRA 2 tool lengths	DX	4-35
Align HYDRA 2 reference background	DX	4-36
Measure HYDRA reference background height	SX/DX	4-40
Measure HYDRA 2 reference background height	DX	
Calibrate HYDRA camera optics (fine)	LX	4-41
Measure HYDRA reference line	SX/DX	4-43
Measure HYDRA tool offsets	SX/DX	4-44
Measure HYDRA 2 tool offsets	DX	
Measure centering offsets for HYDRA camera	LX	4-45
Measure centering offsets for Linescan camera	SX/DX	4-46
Measure centering offsets for Linescan camera 2	DX	

- Press <F1> to run through the required calibrations.

Command Keys



F1 – Finish calibration

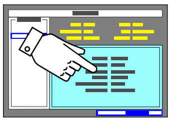
By pressing <F1> all non-performed calibration steps will be executed in the required order. For each operation TPSys will display a pop-up window declaring which operation will be started. If an operation is aborted, or fails, TPSys will return to the main window without performing the remaining steps. After an operation is completed the *Date* column is updated.

F2 – Clear calibration status

Pressing <F2> will clear all timestamps, marking all operations as not performed.

Enter – Perform specific calibration

To perform a specific calibration, place the cursor on the desired line and press <Enter>. If you select not to perform dependent steps, the operation will be executed but not marked as performed. The system will warn you if the specified operation invalidates any already performed calibrations. It you proceed with the operation, the timestamp for all invalidated calibration operations will be cleared.



Data

Date

Timestamp showing when a calibration step was performed. If no calibration has been performed the column is blank.

Operation

All required calibration steps in the preferred order.

Calibrate the vacuum system

Purpose

The purpose of this measurement is to calibrate the vacuum sensors.

Procedure

1. Start the calibration by selecting *Utility* > *Installation and Calibration* > *Calibrate the vacuum system*
2. Follow the instructions presented on the screen.
3. If the procedure is completed without errors then accept the result presented by the system.
4. If this calibration is performed on the MY100 DX machine then perform the same procedure on the other vacuum sensor unit.

X-beam reference shape calibration

Purpose

The x-wagon's linear motor emits heat when it moves along the machine frames X beam. The emitted heat causes the X beam to slightly alter its shape.

The purpose of this measurement is to enable the software to compensate for position deviations caused by the altered shape of the X beam.

Procedure

1. Start the calibration by selecting *Utility* > *Installation and Calibration* > *X-beam reference shape calibration*
2. Follow the instructions presented on the screen.
   – When prompted, accept that the presented list with calibrations will be made invalid after this calibration is done.
   – The system will inform that the machine will need a certain amount of time to cool down before the machine can precede with the calibration. The calibration can be started when the machine is cool enough.
3. If the procedure is completed without errors then accept the result presented by the system.

X-wagon camera calibration (1 or 2)

Purpose

The purpose of this calibration is (with the aid of a calibration board) to calibrate the distortion of the X-wagon camera optics.

Requirements

– Area Calibration Plate (L-015-0450), see Figure 4-1.

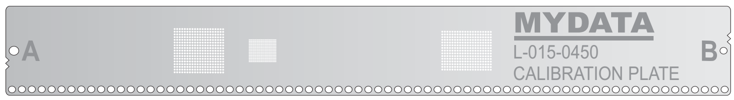


Figure 4-1. L-015-0450 Area Calibration Plate.

– The size of the area calibration background are different depending on the conveyor type.

Use area calibration background according to table below.

Conveyor type	Article number
T3	L-015-1685
T4	L-015-1686
T5	L-015-1687
T6	L-015-1688

– Area Calibration Background (L-015-1686), see Figure 4-2 and 4-3.

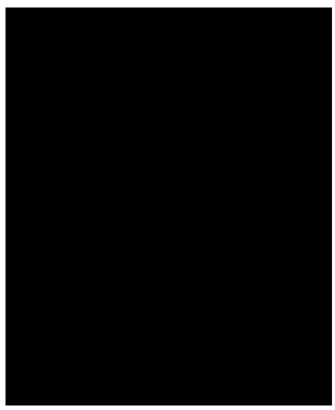


Figure 4-2. Area Calibration Background (Front).

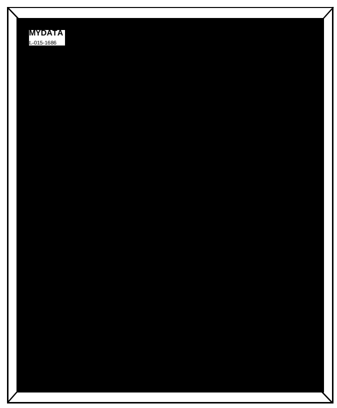


Figure 4-3. Area Calibration Background (Back).

Procedure

1. Start the calibration by selecting *Utility > Installation and Calibration > X-wagon camera 1 calibration*
2. Follow the instructions presented on the screen.
   - When prompted, set the conveyor width to the width of the area calibration background.

     The width and length of the area calibration background is printed on a label attached on the backside of the calibration background. The width is the second set of figures on the label.
   - When prompted to insert board, open the front hood and place a number of support pins ('A' in Figure 4-5) on the conveyors lift table. Distribute the support pins evenly over the place area ('B').

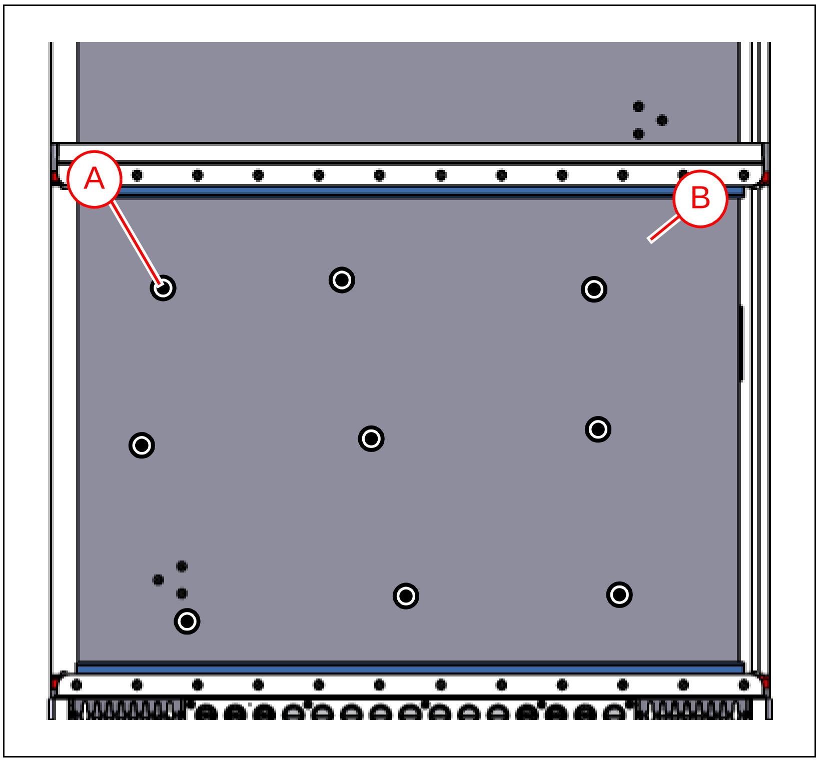


Figure 4-4. Distribute support pins.

The support pins are important to prevent the area calibration background from flexing when the calibrations are done. A flexing background can produce inaccurate calibrations and measurements.

– When ready, insert the area calibration background with the white lines facing down, see Figure 4-3. Orient the background so that the front and back edges of the area calibration background ('A' in Figure 4-5) rest on the conveyor belts ('B').

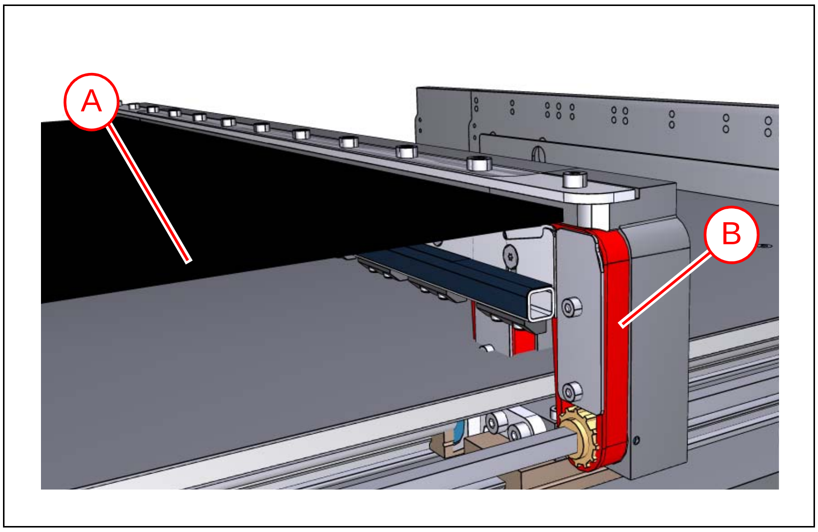


Figure 4-5. Insert area calibration background.

– Press the Open/Close button ('A' in Figure 4-6) to open the conveyor, this makes it possible to insert the area calibration background. The conveyor closes when the button is released.

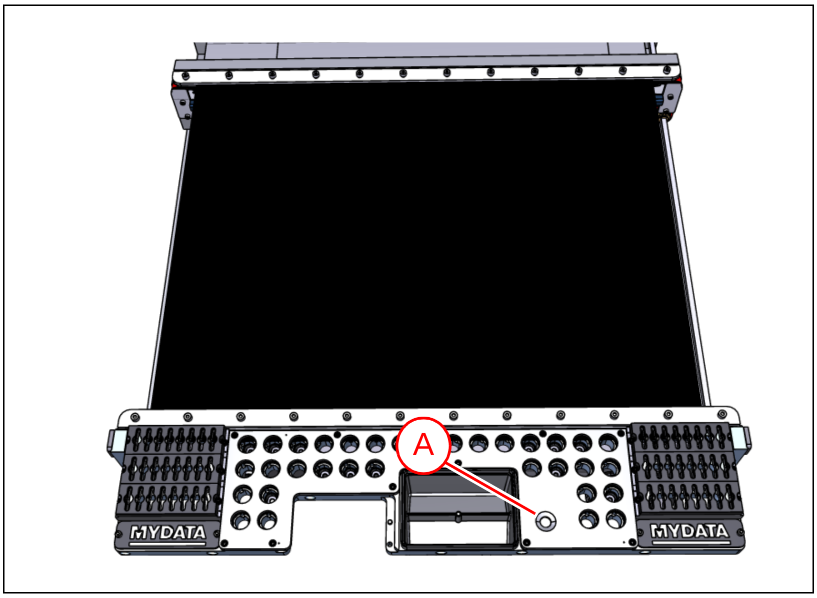


Figure 4-6. Open/Close button.

3. When prompted, place the area calibration plate ('A' in Figure 4-7) on the area calibration background ('B').

   Place the area calibration plate approximately aligned to the X axis.

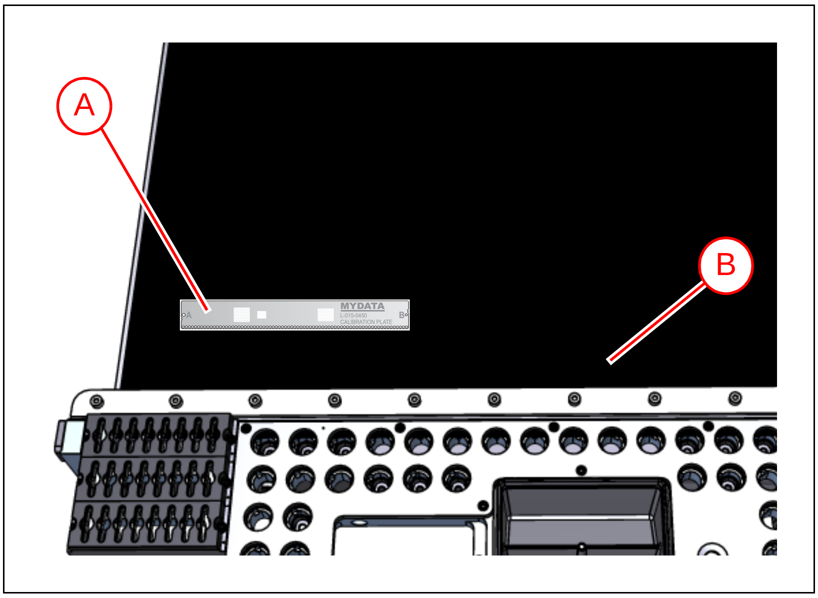


Figure 4-7. Area calibration plate on area calibration background.

4. When prompted, use the trackball to locate the fiducial marks ('A' and 'B') on the place the area calibration plate, see Figure 4-8. Press <Enter> when ready.

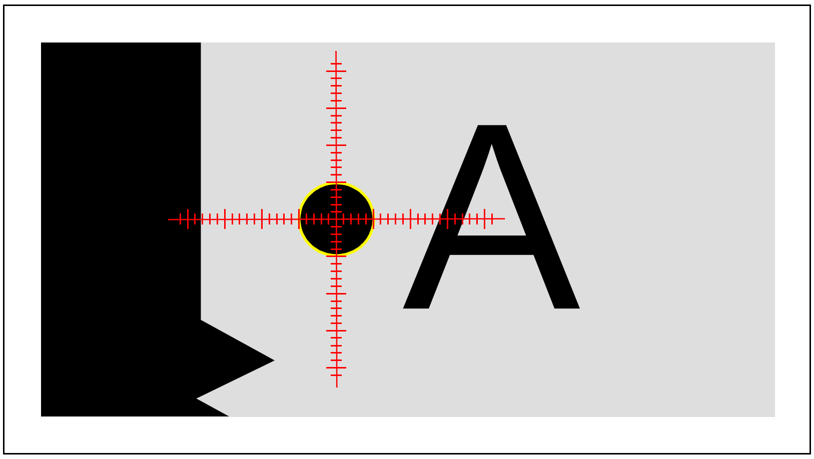


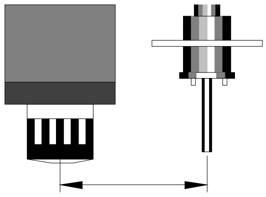
Figure 4-8. L-015-0450 Area Calibration Plate.

   – When prompted to find a place to measure the board level on, determine if the location suggested by the system is acceptable then accept the position. Otherwise use the trackball to find a more suitable free space somewhere on the area calibration background.

5. If the procedure is completed without errors then accept the result presented by the system.

6. If this procedure was performed on the MY100 DX machine then return here later in the installation procedure and perform the same procedure on the other X-wagon camera.

Coarse measurement of Z-unit offset (1 or 2)



Purpose

To set a coarse offset between the optical axis of the X-wagon camera and the mount tool center line.

Procedure

1. Start the calibration by selecting *Coarse measurement of Z-unit offset* in the *Calibration* window.
2. Follow the instructions presented on the screen.
   - If not already done, insert the area calibration background and area calibration plate as described in the procedure on page 4-10.
   - When prompted, accept the positions that is automatically presented by the system.
   - When prompted, use the trackball to locate the fiducial marks ('A' and 'B') on the place the area calibration plate, see Figure 4-8. Press <Enter> when ready.
   - When prompted to find a place to measure the board level on, determine if the location suggested by the system is appropriate then accept the position. Otherwise use the trackball to find a more suitable free space somewhere on the area calibration background.
3. If the presented result is within the range of ±0.5mm then accept the result presented by the system.

   If the presented result is **not** within the range of ±0.5mm. Then the camera’s Y position needs to be adjusted.
   See Chapter 9 *Vision Systems*.
4. If this procedure was performed on the MY100 DX machine then return here later in the installation procedure and perform the same procedure on the other Z unit.

Place area calibration

Purpose

This procedure is used to calibrate the assembly table place area.

Procedure

1. Start the calibration by selecting *Place area calibration* in the *Calibration* window.
2. Follow the instructions presented on the screen.
   – If not already done, insert the area calibration background and area calibration plate as described in the procedure on page 4-10.
   – When prompted, accept the positions that is automatically presented by the system.
   – When prompted, use the trackball to locate the fiducial marks ('A' and 'B') on the place the area calibration plate, see Figure 4-8. Press <Enter> when ready.
   – When prompted to find a place to measure the board level on, determine if the location suggested by the system is appropriate then accept the position. Otherwise use the trackball to find a more suitable free space somewhere on the area calibration background.
   – When prompted, accept that the system measures the alignment of the X and Y axis.
3. If the procedure is completed without errors then accept the result presented by the system.

   A high standard deviation indicates that the area calibration plate has moved during calibration or that there are some mechanical problems in the machine.

X-wagon camera 2 offset calibration

Purpose

This procedure is only performed on the MY100 DX machine.

To set an offset between the optical axis of the two X-wagon cameras.

Procedure

1. Start the calibration by selecting *X-wagon camera 2 offset calibration* in the *Calibration* window.
2. Follow the instructions presented on the screen.
   - If not already done, insert the area calibration background and area calibration plate as described in the procedure on page 4-10.
   - When prompted, use the trackball to locate the fiducial marks ('A' and 'B') on the place the area calibration plate, see Figure 4-8. Press <Enter> when ready.
   - When prompted to find a place to measure the board level on, determine if the location suggested by the system is appropriate then accept the position. Otherwise use the trackball to find a more suitable free space somewhere on the area calibration background.
3. If the procedure is completed without errors then accept the result presented by the system.

Measure Z2 length

Purpose

This procedure is only performed on the MY100 DX machine.

To set an offset between the two Z units.

Procedure

1. Start the calibration by selecting *Measure Z2 length* in the *Calibration* window.
2. Follow the instructions presented on the screen.
   - When prompted to find a place to measure the Z level on, determine if the location suggested by the system is appropriate then accept the position. Otherwise use the trackball to find a more suitable free space somewhere on the area calibration background.
3. If the procedure is completed without errors then accept the result presented by the system.

Z-unit offset (1 or 2)

Purpose

To set an offset between the optical axis of the **right** X-wagon camera and the mount tool center line.

Requirements

– Calibration component (L-010-0166-1 HCOB ED-1), see Figure 4-9.

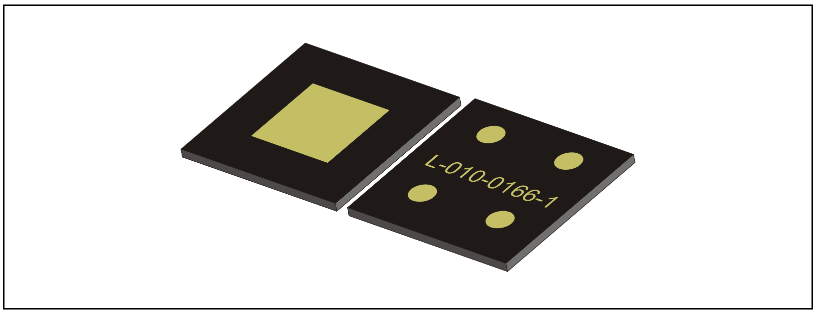


Figure 4-9. Calibration component (L-010-0166-1 HCOB ED-1)

Procedure

1. Start the calibration by selecting *Z-unit offset* in the *Calibration* window.

2. Follow the instructions presented on the screen.

– When prompted, put the calibration component on the area calibration background (If not already done, insert the area calibration background as described in the procedure on page 4-10). The component should be placed on the calibration background with the text and four dots upwards, see Figure 4-9.

– When prompted, use the trackball to center the camera crosshairs on the requested corners of the calibration component.

– When prompted to find a place to measure the board level on, determine if the location suggested by the system is appropriate then accept the position. Otherwise use the trackball to find a more suitable free space somewhere on the area calibration background.

3. If the presented result is within the range of ±0.5mm then accept the result presented by the system.

If the presented result is **not** within the range of ±0.5mm. Then the camera's Y position needs to be adjusted.
See Chapter 9 *Vision Systems*.

4. If this procedure was performed on the MY100 DX machine then return here later in the installation procedure and perform the same procedure on the other Z unit.

Mount tool offset calibration (1 or 2)

Purpose

To fine tune the offset between the optical axis of the X-wagon camera and the mount tool center line outside the calibrated place area.

Procedure

1. Start the calibration by selecting *Mount tool offset calibration* in the *Calibration* window.
2. Follow the instructions presented on the screen.
   - If not already done, insert the area calibration background as described in the procedure on page 4-10.
   - When prompted, place the calibration component on the area calibration background.
   - When prompted, use the trackball to center the camera crosshairs on the requested corners of the calibration component.
   - When prompted, accept the positions that is automatically located by the system.
3. If the procedure is completed without errors then accept the result presented by the system.
4. If this procedure was performed on the MY100 DX machine then return here later in the installation procedure and perform the same procedure on the other mount tool offset.

Centering Base Level measurement (1 or 2)

Purpose

This procedure measures the vertical position of the centering jaws, which equals the base centering level (see Figure 4-10).

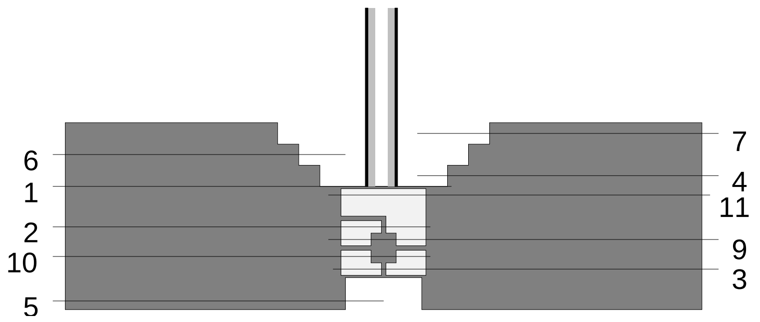


Figure 4-10. Mechanical centering levels.

The mechanical centering level must always be measured if the centering jaws have been loosened or if a centering or electrical verifying problem occurs.

Procedure

1. Start the calibration by selecting *Centering Base Level measurement* in the *Calibration* window.
2. Follow the instructions presented on the screen.
3. If the procedure is completed without errors then accept the result presented by the system.

   The vertical position of the centering jaws is measured and the new value is stored as parameter *21.0221 Centering; Centering base level* which normally equals centering level Number 1.
4. If this procedure was performed on the MY100 DX machine then return here later in the installation procedure and perform the same procedure on the other mechanical centering unit.

Mechanical centering unit alignment (1 or 2)

Purpose

The purpose of this calibration step is to mechanically align the mechanical centering unit to the rotational center of the Z unit mount tool.

Requirements

– Calibration component (L-010-0166-1 HCOB ED-1), see Figure 4-9.

Procedure

1. Start the calibration by selecting *Mechanical centering unit alignment* in the *Calibration* window.
2. Follow the instructions presented on the screen.
   – When prompted, put the calibration component on the area calibration background (If not already done, insert the area calibration background as described in the procedure on page 4-10). The component should be placed on the calibration background with the text and four dots upwards, see Figure 4-9.
   – When prompted, use the trackball to center the camera crosshairs on the requested corners of the calibration component.
3. If the procedure is completed without errors then accept the result presented by the system.

   If the misalignment is too big, then the mechanical centering unit must be mechanically adjusted (see Chapter 8 for details).
4. If this procedure was performed on the MY100 DX machine then return here later in the installation procedure and perform the same procedure on the other mechanical centering unit.

Cable resistance measurement (1 or 2)

Purpose

This procedure is used to measure the cable resistance in wires included in the electrical verification circuit, and to update this value in the system.

The cable resistance has effect when verifying low ohm resistors only, see below.

Requirements

– Zero ohm resistors are required to perform this measurement.

Procedure

1. Start the calibration by selecting *Cable resistance measurement* in the *Calibration* window.

– When prompted, select the appropriate package from the shown package list.

– When prompted, accept the presented measuring angle 90º.

– When prompted, apply manually a zero ohm resistor with the selected package to the tool tip in 0º, see figure.

2. If the procedure is completed without errors then accept the result presented by the system.

This procedure updates the *111.0002 Right X wagon; Cable resistance* or *111.0012 Left X wagon; Cable resistance* parameter. The default value for this parameter is 0.6 ohm, which, if incorrect, has affect only on resistors with a resistance of less than 50 ohm approximately.

3. If this procedure was performed on the MY100 DX machine then return here later in the installation procedure and perform the same procedure on the other mechanical centering unit.

Optical Centering Illumination (SVC, HRC),(1 or 2)

Purpose

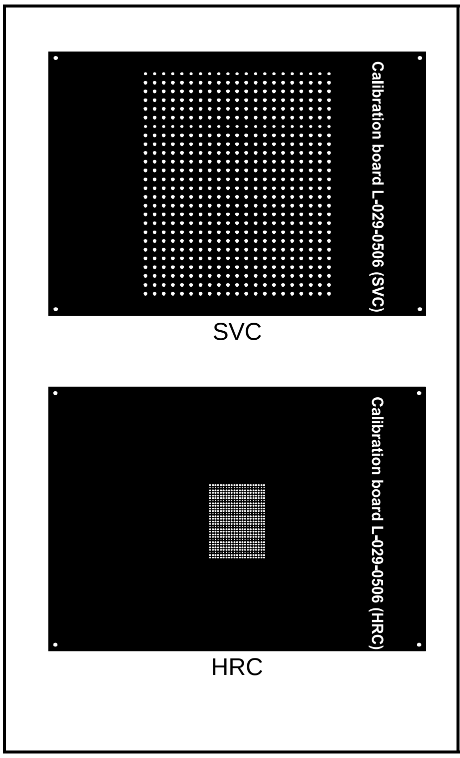
This procedure describes how to calibrate the illumination on the SVC (Standard Vision Camera) and HRC (High Resolution Camera). There are two different calibration boards available today. The black board with printed dot patterns and the grey board with no printed pattern. When performing the calibration, the system will prompt the user to declare which calibration board that is to be used.

When calibrating the illumination on the DVC (Dual Vision Camera), SVC and HRC combined in the same unit, first calibrate the illumination on the HRC camera, then calibrate the illumination on the SVC camera. Do not calibrate in the opposite order. When calibrating the SVC camera in a DVC unit, exclude step 3 below (mechanical adjustment of the camera unit).

Requirements

- C23S or C23 mount tool.
- Black calibration board, see Figure 4-11. One side of the black calibration board is used for calibrating the illumination on the SVC and the opposite side is used for the HRC in a dual vision system.

  Or...
- Grey calibration board, see Figure 4-12. The grey calibration board uses the same side for calibrating the illumination on any camera. The board should always be inserted with the label facing upwards.
- A rubber cloth is provided with the board. This cloth will keep the board from sliding on the area calibration background when the Y wagon moves.



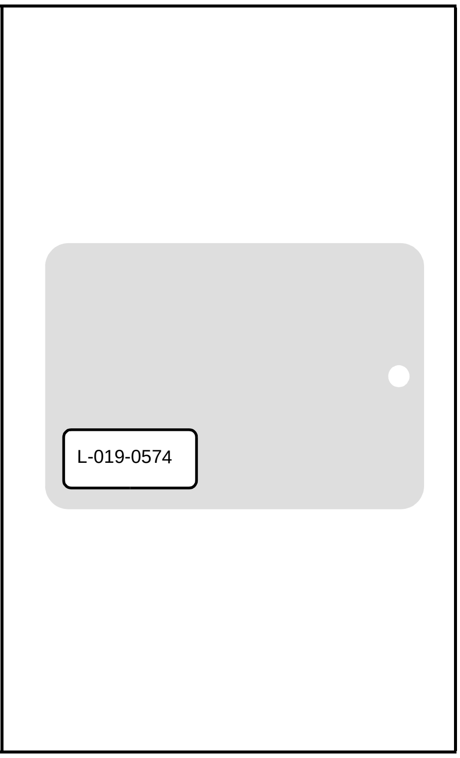


Figure 4-11. Black calibration board. *Figure 4-12. Grey calibration board.*

Procedure

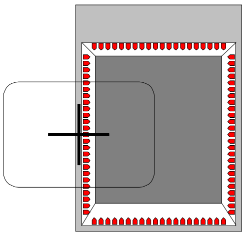
1. Start the procedure by selecting the camera to calibrate:
   - Optical centering HRC camera 1 illumination

   or...

   - Optical centering standard camera 1 illumination

   from the *Calibration* list.

2. Follow the instructions presented on the screen.



   - When prompted, use the trackball to center crosshairs on the camera's left frame (see figure).
   - When prompted, select if the black or grey calibration board should be used to calibrate the illumination (see Figure 4-11 and 4-12).
   - When prompted, place the rubber cloth and the calibration board on the area calibration background (if not already done, insert the area calibration background as described in step 2 on page 4-10) the rubber cloth will keep the calibration board from sliding on the area calibration background.

     If the black calibration board is used, make sure that the correct calibration pattern is exposed to the camera (see Figure 4-11).

If the mount head has trouble lifting the calibration board, then place a piece of paper between the calibration board and the rubber cloth, this would prevent the calibration plate from sticking to the rubber cloth.

   - When prompted, use the trackball to center the camera crosshairs on the requested fiducial marks of the calibration board.

     If the grey calibration board is used then use the trackball to center the camera crosshairs on the requested corners of the calibration board.
   - When prompted to find a place to measure the board level on, determine if the location suggested by the system is appropriate then accept the position. Otherwise use the trackball to find a more suitable free space somewhere on the area calibration background.
   - When prompted, use the trackball to position the crosshairs on the center of the shown calibration pattern.

The camera is positioned in 90 degrees. Consequently, the dot area should be centered vertically on the monitor.

To pan the image, use the key combinations in the table below.

Key combination		Move image
control +	**Up** Arrow	Up
	Down Arrow	Down
	Left Arrow	Left
	Right Arrow	Right
	Page Up	Zoom Out
	Page Down	Zoom In
	Home	Back to normal view

3. If the calibration pattern is not aligned in the Y direction, it might be necessary to adjust the Y position of the camera unit mechanically, see page 9-14.

Do not adjust a DVC unit mechanically if the SVC is calibrated. Only adjust the DVC unit mechanically when the HRC is calibrated. A machine with only the SVC can be mechanically adjusted anytime.

---

4. If this procedure was performed on the MY100 DX machine then return here later in the installation procedure and perform the same procedure on the other optical centering cameras.

Optical Centering Calibration (SVC, HRC),(1 or 2)

Purpose

This procedure describes how to calibrate the SVC (Standard Vision Camera) and HRC (High Resolution Camera).

When calibrating a DVC (Dual Vision Camera), SVC and HRC combined in the same unit, first calibrate the HRC camera, then calibrate the SVC camera. Do not calibrate in the opposite order. When calibrating the SVC camera in a DVC unit, exclude step 3 below (mechanical adjustment of the camera unit).

Requirements

- C23S or C23 mount tool.
- Black calibration board, see Figure 4-13.
- A rubber cloth is provided with the board. This cloth will keep the board from sliding on the area calibration background when the Y wagon moves.

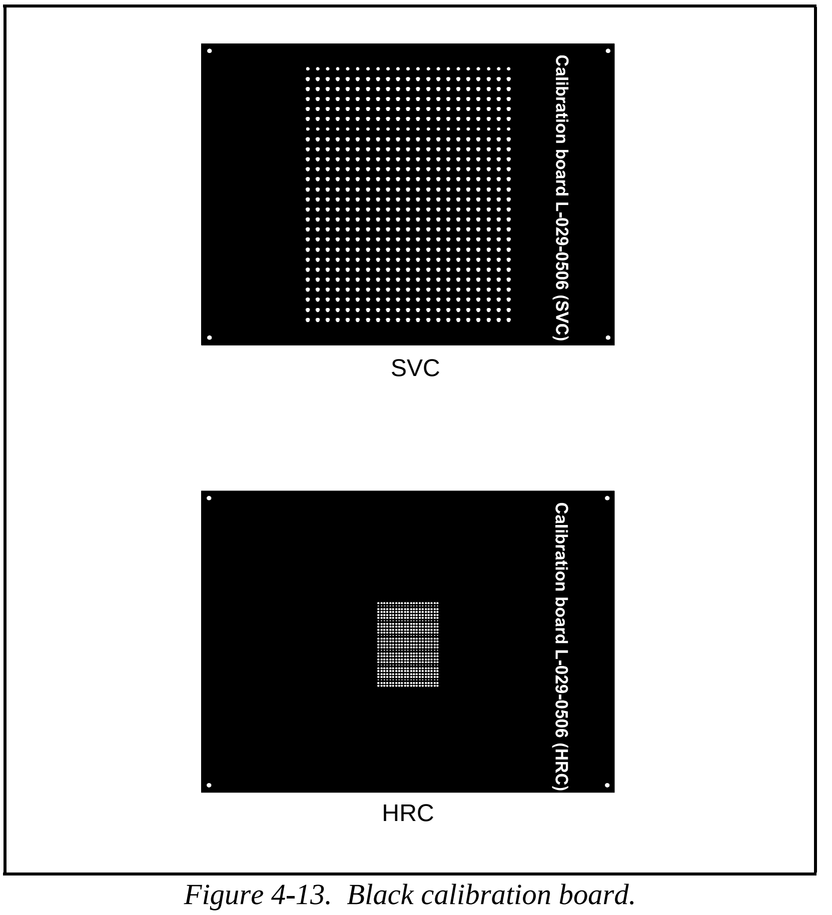


Figure 4-13. Black calibration board.

One side of the calibration board in Figure 4-13 is used for calibrating the SVC (Standard Vision Camera) and the opposite side of the calibration board is used for calibrating the HRC (High Resolution camera) in a dual vision system.

Procedure

1. Start the procedure by selecting the camera to calibrate:

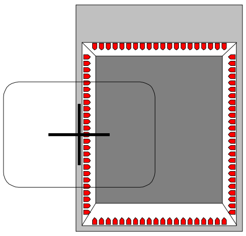
– *Optical centering HRC camera 1 calibration*

or...

– *Optical centering standard camera 1 calibration*

from the *Calibration* list.

2. Follow the instructions presented on the screen.



– When prompted, use the trackball to center crosshairs on the camera's left frame (see figure).

– When prompted, enter the calibration plate thickness. The thickness value is printed on the calibration plate.

– When prompted, place the rubber cloth and the calibration plate on the area calibration background (if not already done, insert the area calibration background as described in step 2 on page 4-10) the rubber cloth will keep the calibration plate from sliding on the area calibration background. Depending on the camera that is currently calibrated, make sure that the correct calibration pattern is exposed to the camera (see Figure 4-13).

☞ If the mount head has trouble lifting the calibration plate, then place a piece of paper between the calibration plate and the rubber cloth, this would prevent the calibration plate from sticking to the rubber cloth.

– When prompted, use the trackball to center the camera crosshairs on the requested fiducial marks of the calibration plate.

– When prompted to find a place to measure the board level on, determine if the location suggested by the system is appropriate then accept the position. Otherwise use the trackball to find a more suitable free space somewhere on the area calibration background.

– When prompted, use the trackball to position the crosshairs on the center of the shown calibration pattern.

The camera is positioned in 90 degrees. Consequently, the dot area should be centered vertically on the monitor.

To pan the image, use the key combinations in the table below.

Key combination		Move image
	Up Arrow	Up
	Down Arrow	Down
	Left Arrow	Left
control +	**Right** Arrow	Right
	Page Up	Zoom Out
	Page Down	Zoom In
	Home	Back to normal view

3. If the calibration pattern is not aligned in the Y direction, it might be necessary to adjust the Y position of the camera unit mechanically, see page 9-14.

Do not adjust a DVC unit mechanically if the SVC is calibrated. Only adjust the DVC unit mechanically when the HRC is calibrated. A machine with only the SVC can be mechanically adjusted anytime.

4. If this procedure was performed on the MY100 DX machine then return here later in the installation procedure and perform the same procedure on the other optical centering cameras.

Z-Unit or Z-Unit 2 Theta Calibration

Purpose

This procedure describes how to calibrate the Z-unit.

Requirements

- Mount tool C23
- Calibration component (L-040-1084), see Figure 4-14.

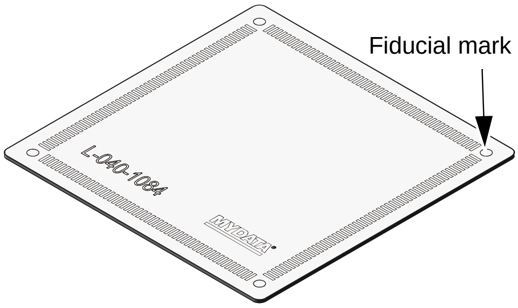


Figure 4-14. Calibration component (L-040-1084).

Procedure

1. Start the procedure by selecting the Z-unit to calibrate:
   - Z-unit

   or...
   - Z-unit 2

   from the *Calibration* list.
2. Follow the instructions presented on the screen.
   - When prompted, put the calibration component on the calibration background with the text upwards.
   - When prompted, use the trackball to center the camera crosshairs on the requested fiducial marks of the calibration plate.
   - When prompted to find a place to measure the board level on, determine if the location suggested by the system is appropriate then accept the position. Otherwise use the trackball to find a more suitable free space somewhere on the calibration background area.
   - A blue popup appears if the theta angle error is within the error limit. A red popup appears if the calibration result is not within the error limit.
3. When the result is within the error limit then accept the result.

Linescan Camera Calibration (1 or 2)

Purpose

This procedure describes how to calibrate the Linescan camera.

Requirements

- C23S or C23 mount tool.
- Calibration plate Linescan camera (L-010-0452B), see Figure 4-15.

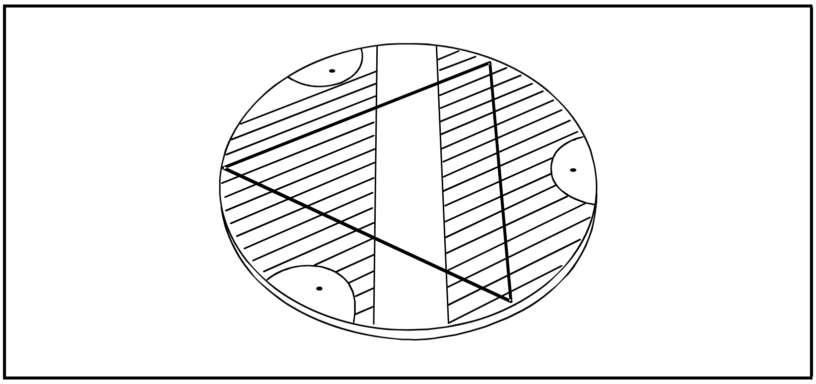


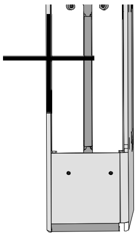
Figure 4-15. Calibration plate Linescan camera (L-010-0452B).

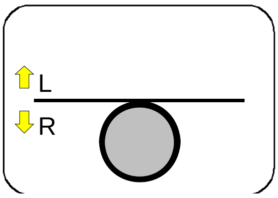
Procedure

1. Start the procedure by selecting the camera to calibrate:
   - *Linescan camera 1 calibration*

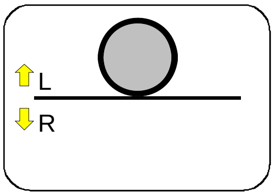
     or...
   - *Linescan camera 2 calibration*

     from the *Calibration* list.
2. Follow the instructions presented on the screen.
   - When prompted, use the trackball to center crosshairs on the camera's left frame (see figure).



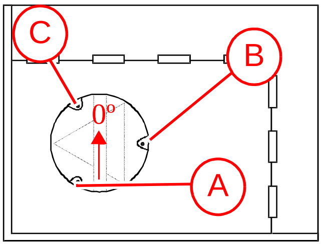


– When prompted, align the outer left side of the Midas tool holder to the horizontal line in the center of the screen. Use the trackball to move the tool position up or down.



– When prompted, align the outer right side of the Midas tool holder in the same way as above.

– When prompted, enter the calibration plate thickness. The thickness value is printed on the calibration plate. The plate thickness does not include the supports.



– When prompted, (if not already done, insert the area calibration background as described in step 2 on page 4-10) put the calibration plate on the area calibration background with the supports facing down. Orient the calibration plate's printed arrow to face inwards (see figure).

– When prompted, use the trackball to center the camera crosshairs on the calibration plate's three fiducial marks (see figure).

A = *Center cross hairs on lower left fiducial mark of calibration plate.*

B = *Center cross hairs on center right fiducial mark of calibration plate.*

C = Center cross hairs on upper left fiducial mark of calibration plate.

When ready, the calibration starts and the *Running Linescan camera calibration* dialog box is presented on screen.

3. If the procedure is completed without errors then accept the result presented by the system.

4. If the machine is equipped with more than one Linescan camera, then return here later in the installation procedure and perform the same procedure on the other Linescan camera.

Optical Centering Camera Offsets (SVC, HRC, LSC), (1 or 2)

Purpose

This calibration step needs to be performed for all centering cameras in the machine in order to increase the accuracy of the computed centering offsets.

Requirements

- Calibration component (L-010-0166-1 HCOB ED-1), see page 4-9.

Procedure

1. Start the procedure by selecting the camera to calibrate:
   - *Optical centering standard camera 1 offsets*

     or...
   - *Optical centering HRC camera 1 offsets*

     or...
   - *Linescan camera 1 offsets*

     from the *Calibration* list.
2. Follow the instructions presented on the screen.
   - When prompted, put the calibration component on the area calibration background (If not already done, insert the area calibration background as described in step 2 on page 4-10). The component should be placed on the calibration background with the text and four dots upwards, see Figure 4-9.
   - When prompted, use the trackball to center the camera crosshairs on the requested fiducial marks of the calibration plate.
   - When prompted to find a place to measure the board level on, determine if the location suggested by the system is appropriate then accept the position. Otherwise use the trackball to find a more suitable free space somewhere on the area calibration background.

   TPSys picks up the component and acquires the necessary number of images and calculates the centering offsets.
3. If the procedure is completed without errors then accept the result presented by the system.
4. If this procedure was performed on the MY100 DX machine then return here later in the installation procedure and perform the same procedure on the other optical centering cameras.

Linescan Camera Fine Tune (1 or 2)

Purpose

After a Linescan camera calibration it is always necessary to perform a fine tuning to achieve the highest possible placement accuracy. This procedure measures the angle between the Midas LSC reference line and the X axis of the table coordinate system.

Requirements

- C23S or C23 mount tool.
- Calibration component (L-040-1084), see Figure 4-16.

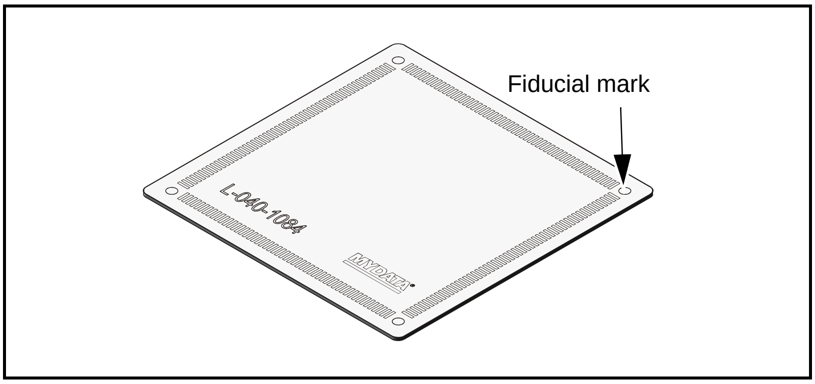


Figure 4-16. Calibration component (L-040-1084).

5. Start the calibration by selecting *Linescan camera 1 fine tune* in the *Calibration* window.
6. Follow the instructions presented on the screen.
   - When prompted, put the calibration component on the area calibration background (If not already done, insert the area calibration background as described in step 2 on page 4-10). The component should be placed on the calibration background with the text up, see Figure 4-9.
   - When prompted, use the trackball to center the camera crosshairs on the requested fiducial marks of the calibration plate.
   - When prompted to find a place to measure the board level on, determine if the location suggested by the system is appropriate then accept the position. Otherwise use the trackball to find a more suitable free space somewhere on the area calibration background.

If the mount head has trouble lifting the calibration component, then place a piece of paper under the calibration plate, this would prevent the calibration component from sticking to the area calibration background.

Centering camera angle offset value in the parameter file is now adjusted automatically.

7. If the procedure is completed without errors then accept the result presented by the system.
8. If the machine is equipped with more than one Linescan camera, then return here later in the installation procedure and perform the same procedure on the other Linescan camera.

Align HYDRA camera X/Y

Purpose

To measure the X-wise coordinate of the HVC and to physically adjust the camera Y-wise so the center of the CCD coincides with the center of the mount head.

Procedure

1. Start the calibration by selecting *Align HYDRA camera X/Y* in the *Calibration* window.
2. Follow the instructions presented on the screen.

   The system fetches the tool to use and moves the mount head to the expected X-position of the camera and moves the tool to the centering level.

   – When prompted, use the trackball to align the tool's X direction inside the square, see Figure 4-17.

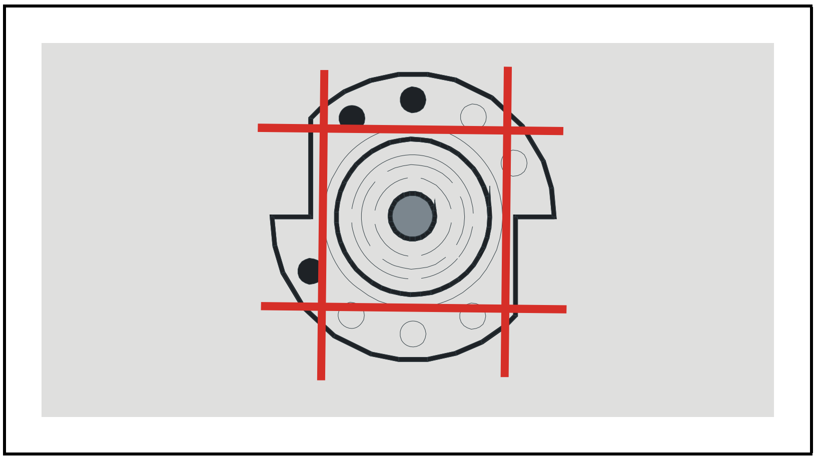
   

   Figure 4-17. Align the tool inside the square.

   If necessary the HYDRA camera can also be mechanically adjusted in Y-direction, see Chapter 9 for details.
3. If the procedure is completed without errors then accept the result presented by the system.

Coarse adjust HYDRA tool offsets (1 or 2)

Purpose

To set good approximate values of the HYDRA Tool Offsets. It is necessary to have good offset values to be able to pick components in later installation procedures.

Procedure

Depending on the cameras installed, this procedure can be carried out with either the HC2 (HYDRA Camera 2) or the LSC (Linescan Camera).

1. Start the calibration by selecting *Coarse adjust HYDRA tool offsets* in the *Calibration* window.
2. Follow the instructions presented on the screen.
   – When prompted, use the trackball to align tool number 4 between the two parallel lines drawn in the graph. (See Figure 4-17 and Figure 4-17 for HC2 respective LSC).

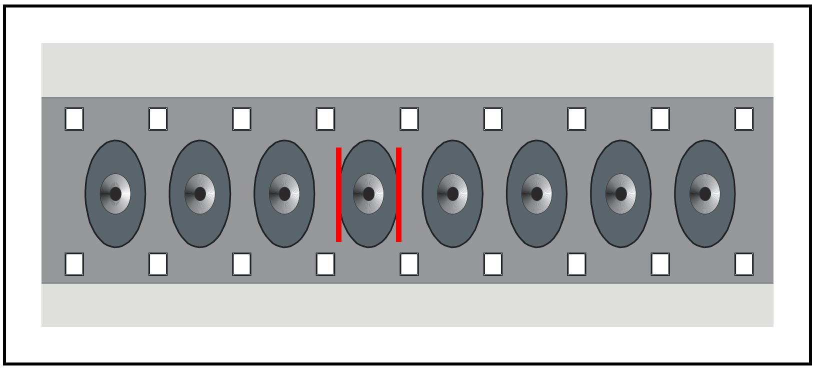


Figure 4-18. Align the tool using (HC2)HYDRA Camera 2.

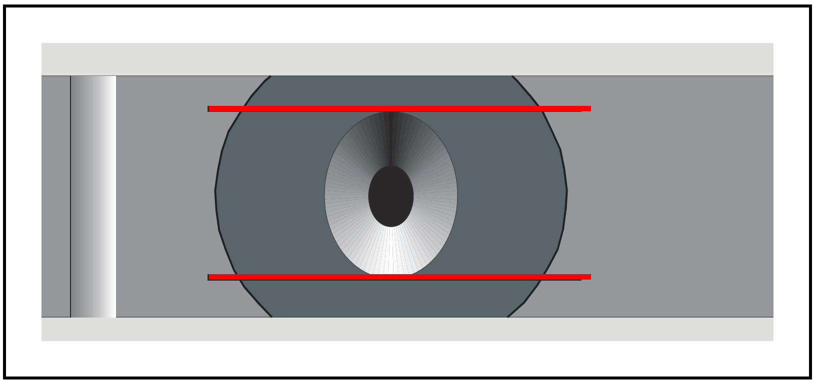


Figure 4-19. Align the tool using LSC.

3. If the procedure is completed without errors then accept the result presented by the system.
4. If this procedure was performed on the MY100 DX machine then return here later in the installation procedure and perform the same procedure on the other HYDRA.

Measure HYDRA tool lengths (1 or 2)

Purpose

To measure the length (offset Z-Hz) of the HYDRA tool tubes.

Procedure

☞ There shall not be any tool tips on the tool tubes during this measurement.

1. Start the calibration by selecting *Measure HYDRA tool lengths, head 1* in the *Calibration* window.
2. Follow the instructions presented on the screen.
   - When prompted, press <Ctrl> + A to measure all the HYDRA tool tubes.
   - When prompted, use the trackball to move the X-wagon camera to a hard, even and clean surface suitable for measuring the tool lengths, for example the PCB guide bar on the conveyor.

☞ It is important to make sure the HYDRA heads can reach the measurement surface. The Midas tool bank on a conveyor is too low for the HYDRA to reach. Also make sure the Midas touches the measurement surface properly.

   - If there are any tool tips on the HYDRA tool tubes, the system will prompt you to remove the tool tips. Follow the instructions presented on the screen. The machine starts the measuring process when all tool tips have been removed.
3. If the procedure is completed without errors then accept the result presented by the system.
4. If this procedure was performed on the MY100 DX machine then return here later in the installation procedure and perform the same procedure on the other HYDRA.

Align HYDRA reference background (1 or 2)

Purpose

To align the reference background parallel with the X-axis.

Procedure

Depending on the cameras installed, this procedure can be carried out with either the HC2 (HYDRA Camera 2) or the LSC (Linescan Camera).

1. Start the calibration by selecting *Align HYDRA reference background* in the *Calibration* window.
2. Follow the instructions presented on the screen.
   – When prompted, use the trackball to position the two small red crosses to be in the middle of the white reference points (see Figure 4-20 and Figure 4-21 for HC2 respective LSC).

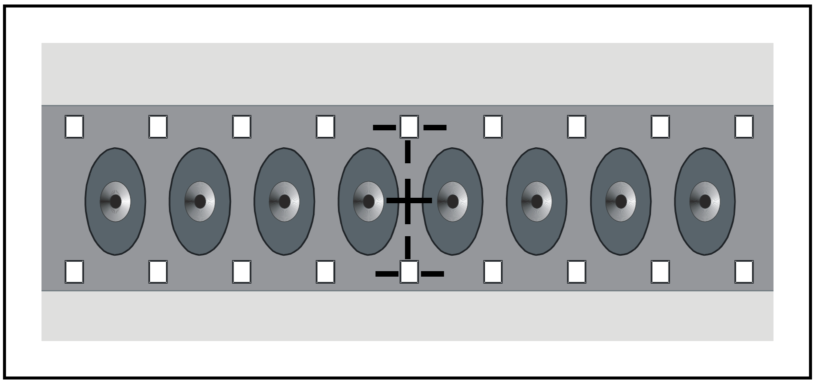


Figure 4-20. Align HYDRA reference background using HC2.

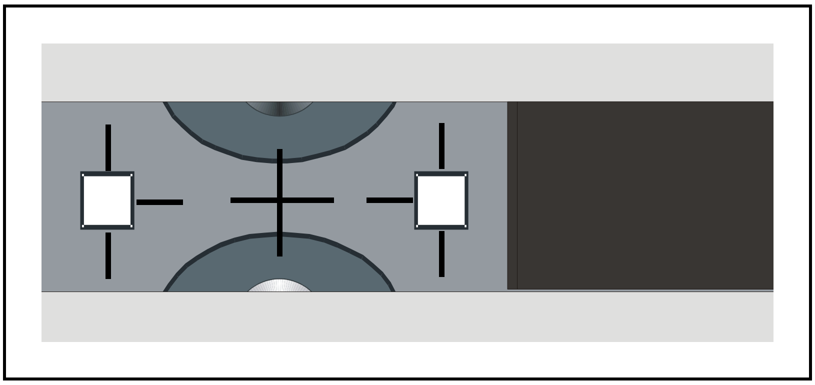


Figure 4-21. Align HYDRA reference background using LSC.

3. If the procedure is completed without errors then accept the result presented by the system.
4. If this procedure was performed on the MY100 DX machine then return here later in the installation procedure and perform the same procedure on the other HYDRA.

Measure HYDRA camera Z level

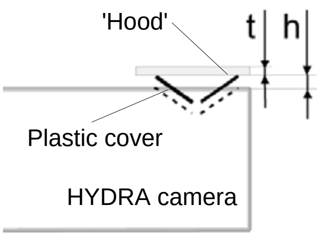
Purpose

To measure the height of the HYDRA camera, to be able to calculate the centering level of the camera.

Requirements

– Slide caliper.

Procedure



To measure the camera Z level with the Z head, a protection hood with known thickness ('t' in the figure) must be placed over the camera opening. Use for example a metal ruler as hood. If the plastic cover of the camera opening is sticking up above the camera housing, this height ('h' in the figure) must also be measured and added to the thickness of the hood. Use a slide caliper to measure the height.

1. Start the calibration by selecting *Measure HYDRA camera Z level* in the *Calibration* window.
2. Follow the instructions presented on the screen.
   – When prompted, place the hood (metal ruler) over the plastic cover on the HYDRA camera, so that the Midas can measure the camera height.
   – When prompted, center the cross hairs on the approximate center of the covered camera opening.

     Midas will now measure the camera level.
3. If the procedure is completed without errors then accept the result presented by the system.

Calibrate HYDRA camera optics (coarse), (1 or 2)

Purpose

To calibrate the optical system of the HYDRA camera. This enables TPSys to compensate for non-linearities and distortions in the optical system.

Requirements

- C23S or C23 mount tool.
- Slide caliper.
- Calibration plate HYDRA camera (L-019-0633-2), see Figure 4-22.

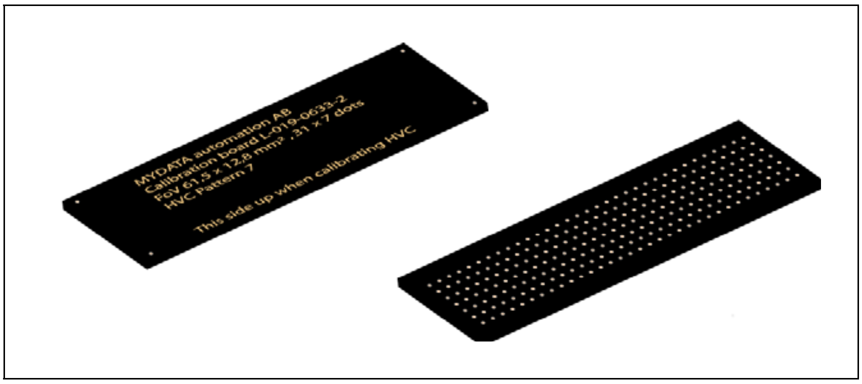


Figure 4-22. L-019-0633-2 Calibration plate.

Procedure

1. Start the calibration by selecting *Calibrate HYDRA camera optics (coarse)* in the *Calibration* window.
2. Follow the instructions presented on the screen.
   - When prompted, enter the calibration plate thickness. Use a slide caliper to measure the thickness value off the calibration plate.
   - When prompted, place the calibration plate on the area calibration background (If not already done, insert the area calibration background as described in step 2 on page 4-10). The calibration plate should be placed on the calibration background with the text facing up, see Figure 4-22.
   - When prompted, use the trackball to center the camera crosshairs on the requested fiducial marks of the calibration plate.
   - When prompted to find a place to measure the board level on, determine if the location suggested by the system is appropriate then accept the position. Otherwise use the trackball to find a more suitable free space somewhere on the area calibration background.

The Midas mount head will now pick up the calibration plate and move to a position above the HYDRA camera.

The camera view with a graphical support pattern is shown on the screen See Figure 4-23.

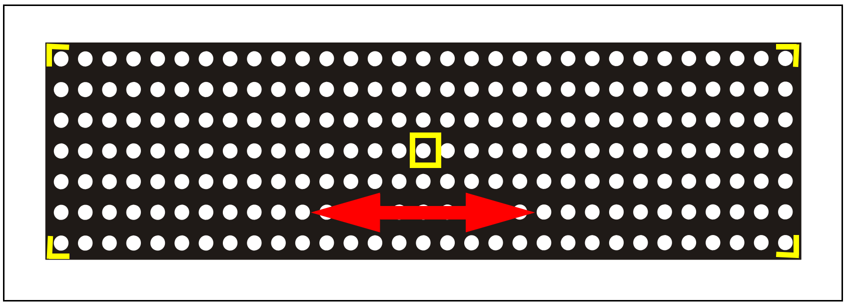


Figure 4-23. Locate X position of calibration plate.

– When prompted, use the trackball and the graphical support pattern to position the crosshairs on the center of the shown calibration pattern, see Figure 4-23.

  If necessary, adjust the cameras Y position. See Chapter 9 for instructions.

3. When the calibration of the camera optics is done, verify the calibration by pressing <Shift> + <F1> and study the view with the small crosses.
4. Ensure that all crosses are in the center of the dots. Move the image with the shortcut keys, see table on page 4-27.
5. If the procedure is completed without errors then accept the result presented by the system.

Measure HYDRA reference background height (1 or 2)

Purpose

To measure the Z-level of the HYDRA reference background. During optical inspection of components picked up by the HYDRA unit, the bottom surface of the components should be at this level during image acquisition.

There is no controlled way of adjusting the HYDRA head vertically when mounting it on the X wagon. By measuring the height of the reference point background, the system will be able to show the components in the same plane as the reference points. This will make the HYDRA system more accurate.

Procedure

1. Start the calibration by selecting *Measure HYDRA reference background height* in the *Calibration* window.
2. Follow the instructions presented on the screen.

   The system automatically picks up the component and acquires the necessary number of images and calculates the reference background height.
3. If the procedure is completed without errors then accept the result presented by the system.
4. If this procedure was performed on the MY100 DX machine then return here later in the installation procedure and perform the same procedure on the other HYDRA.

Calibrate HYDRA camera optics (fine), (1 or 2)

Purpose

To fine-tune the calibration of the HYDRA camera. This enables TPSys to compensate for non-linearities and distortions in the optical system.

Requirements

- C23S or C23 mount tool.
- Slide caliper.
- Calibration plate HYDRA camera (L-019-0633-2), see Figure 4-22.

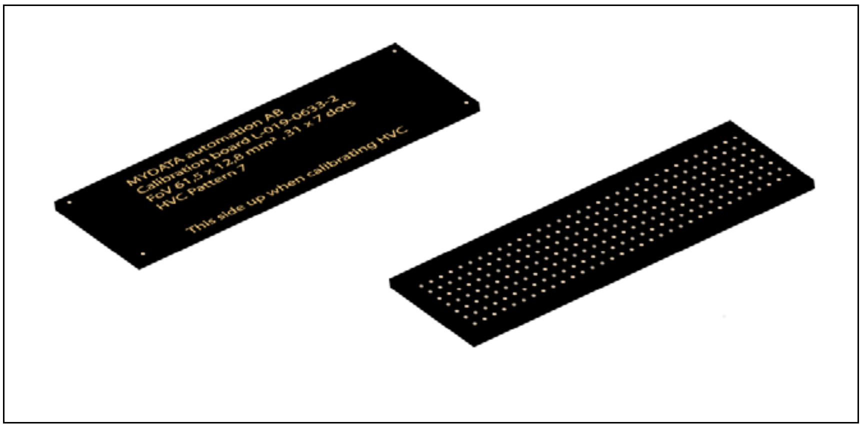


Figure 4-24. L-019-0633-2 Calibration plate.

Procedure

1. Start the calibration by selecting *Calibrate HYDRA camera optics (fine)* in the *Calibration* window.
2. Follow the instructions presented on the screen.
   - When prompted, enter the calibration plate thickness. Use a slide caliper to measure the thickness value off the calibration plate.
   - When prompted, place the calibration plate on the area calibration background (If not already done, insert the area calibration background as described in step 2 on page 4-10). The calibration plate should be placed on the calibration background with the text facing up, see Figure 4-24.
   - When prompted, use the trackball to center the camera crosshairs on the fiducial marks on the calibration plate.
   - When prompted to find a place to measure the board level on. Use the trackball to move the X-wagon camera to a suitable free space somewhere on the area calibration background.

The Midas mount head will now pick up the calibration plate and move to a position above the HYDRA camera.

The camera view with a graphical support pattern is shown on the screen See Figure 4-23.

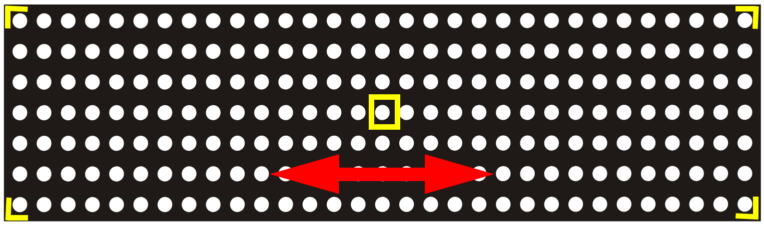


Figure 4-25. Locate X position of calibration plate.

– When prompted, use the trackball and the graphical support pattern to position the crosshairs on the center of the shown calibration pattern, see Figure 4-23.

  You may have to adjust the cameras Y position. Please see page 9-18 for information.

3. When the calibration of the camera optics is done, verify the calibration by pressing <Shift> + <F1> and study the view with the small crosses.

4. Ensure that all crosses are in the center of the dots. Move the image with the shortcut keys, see table on page 4-27.

5. If the procedure is completed without errors then accept the result presented by the system.

Measure HYDRA reference line (1 or 2)

Purpose

To measure the skew and curvature of the reference line on the background and to calculate nominal rotation centers for the HYDRA tools.

Procedure

☞ This procedure can only be carried out if there is a Linescan camera installed in the machine. The procedure is automatically repeated for each Linescan camera installed.

1. Start the calibration by selecting *Measure HYDRA reference line* in the *Calibration* window.
2. Follow the instructions presented on the screen.

   The X wagon moves to the LSC and starts the measurement.

   If more than one LSC is present, the measurement automatically continues on the second LSC.
3. If the procedure is completed without errors then accept the result presented by the system.

Measure HYDRA tool offsets (1 or 2)

Purpose

To measure (fine-tune) the offsets between the individual HYDRA tools and the defined zero point on the X wagon.

Requirements

– Calibration component (L-010-0166-1 HCOB ED-1), see page 4-9.

Procedure

Depending on the cameras installed, this procedure can be carried out with either the HC2 (HYDRA Camera 2) or the LSC (Linescan Camera).

1. Start the calibration by selecting *Measure HYDRA tool offsets* in the *Calibration* window.
2. Follow the instructions presented on the screen.
   – When prompted, press <Ctrl> + A to measure all the HYDRA tool tubes.
   – When prompted, put the calibration component on the area calibration background (If not already done, insert the area calibration background as described in the procedure on page 4-10). The component should be placed on the calibration background with the text and four dots upwards, see Figure 4-9.
   – When prompted, use the trackball to center the camera crosshairs on the requested corners of the calibration component.
   – When prompted to find a place position or measure the board level, determine if the location suggested by the system is appropriate then accept the position. Otherwise use the trackball to find a more suitable free space somewhere on the area calibration background.

   The system picks up the component and acquires the necessary number of images and calculates the tool offsets.
3. If the procedure is completed without errors then accept the result presented by the system.
4. If this procedure was performed on the MY100 DX machine then return here later in the installation procedure and perform the same procedure on the other HYDRA.

Measure centering offsets for HYDRA camera

Purpose

To find the offsets between the nominal and the actual rotation centers of the HYDRA tools when the HYDRA camera is used.

Requirements

- Calibration component (L-010-0166-1 HCOB ED-1), see page 4-9.

Procedure

1. Start the calibration by selecting *Measure centering offsets for HYDRA camera* in the *Calibration* window.
2. Follow the instructions presented on the screen.
   - When prompted, press <Ctrl> + A to measure all the HYDRA tool tubes.
   - When prompted, put the calibration component on the area calibration background (If not already done, insert the area calibration background as described in the procedure on page 4-10). The component should be placed on the calibration background with the text and four dots upwards, see Figure 4-9.
   - When prompted, use the trackball to center the camera crosshairs on the requested corners of the calibration component.
   - When prompted to find a place position or measure the board level, determine if the location suggested by the system is appropriate then accept the position. Otherwise use the trackball to find a more suitable free space somewhere on the area calibration background.

   The system picks up the component and acquires the necessary number of images and calculates the tool offsets.
3. If the procedure is completed without errors then accept the result presented by the system.

Measure centering offsets for Linescan camera (1 or 2)

Purpose

To find the offsets between the nominal and the actual rotation centers of the HYDRA tools when the Linescan camera is used.

Requirements

- Calibration component (L-010-0166-1 HCOB ED-1), see page 4-9.

Procedure

1. Start the calibration by selecting *Measure centering offsets for Linescan camera* in the *Calibration* window.
2. Follow the instructions presented on the screen.
   - When prompted, press <Ctrl> + A to measure all the HYDRA tool tubes.
   - When prompted, put the calibration component on the area calibration background (If not already done, insert the area calibration background as described in the procedure on page 4-10). The component should be placed on the calibration background with the text and four dots upwards, see Figure 4-9.
   - When prompted, use the trackball to center the camera crosshairs on the requested corners of the calibration component.
   - When prompted to find a place position or measure the board level, determine if the location suggested by the system is appropriate then accept the position. Otherwise use the trackball to find a more suitable free space somewhere on the area calibration background.

   The system picks up the component and acquires the necessary number of images and calculates the tool offsets.
3. If the procedure is completed without errors then accept the result presented by the system.
4. If this procedure was performed on the MY100 DX machine then return here later in the installation procedure and perform the same procedure on the other Linescan camera.

5. Mount Head Movement System

This chapter contains the description of the mount head movement system and adjustment and calibration instructions for the mount head movement function.

Also, it contains some procedures to measure particular values for evaluating purposes during calibrations.

The machine contains the following four different movement systems:

1. Mount head movement system moves the X wagon in the X direction. This system is described in this chapter.
2. Y movement moves the Y wagon with the assembly table in the Y direction. The Y movement is described in Chapter 12 *Board Handling System*.
3. Z movement moves the mount tool vertically. The Z movement is described in Chapter 6 *Mount Heads*.
4. Theta movement rotates the mount head. The Theta movement is also described in Chapter 6 *Mount Heads*.

WARNING! In this chapter, some of the procedures cause the machine to make movements. The below warning must be followed for such procedures. Procedures that cause the machine to make movements are marked with this sign next to the text. Before entering such commands, check the following: Ensure that there are no foreign objects on the assembly table, near the tool bank, or within the X wagon, Y wagon, or Tray Wagon Magazine moving areas, and that the standard tool head and the HYDRA *tools are in their upper positions*

System Description

The X movement's purpose is to bring the X-wagon mount heads (Midas and HYDRA) to a magazine and pick up a component using vacuum and then carry the component to the place area and mount the component on the PCB. The X wagons move on the integrated guiding rails located on the machine frames X beam.

The MY100 DX machine is equipped with two X wagons, X wagon right and X wagon left. The right X wagon is master and TPSys will always use the right X wagon first (if possible).

The MY100 SX machine is equipped with X wagon right.

The following text describes the X-wagon initiation procedure on the MY100 DX machine.

When the machine is powered up and TPSys is initiated the left X wagon moves to the far left side of the X beam to find the damper, then it moves to the center of the X beam and stops. The right X wagon simultaneously performs a similar movement on the right side of the X beam. When the initiation is ready, both X wagons stop next to each other in the center of the X beam.

X-Wagon Parts

The X wagon is designed in two versions, X wagon right and X wagon left. X wagon left is close to a mirrored copy of X wagon right otherwise they are similar in operation and design.

The X wagon consists of three major sub assemblies.

- Heat sink unit.

  The heat sink unit comprises the linear motor attached to an aluminum heat sink. Also the linear guides and analog sensor are parts of the unit.

  Further described in section *Heat sink unit* on page 5-3.

- Mount head carrier plate.

  This unit comprises the mount heads, X-wagon camera, centering unit, vacuum valve unit and the linear encoder.

  Further described in section *Mount head carrier plate* on page 5-5.

- Fan holder unit.

  This unit includes fan holder (heat sink ventilation duct), fans, electronic boards and cable chain connectors.

  Further described in section *Fan holder unit.* on page 5-6.

Heat sink unit

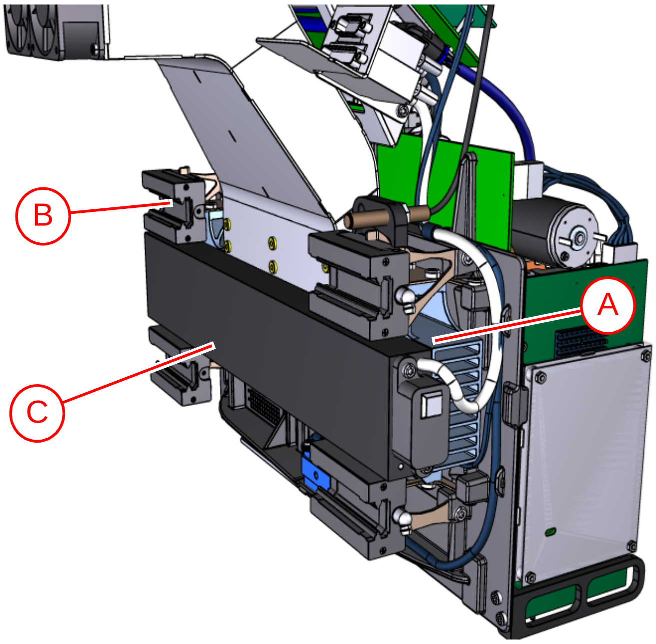


Figure 5-1. Heat sink unit.

The heat sink unit comprises a linear motor ('C' in Figure 5-1) that is attached to an aluminum heat sink ('A'). The heat sink's major purpose is, with the aid of two fans, keep the linear motor cool.

The X wagon(s) are propelled by linear motors that move along the machine's X beam. The linear motor(s) consist of two major parts, the coil ('C') on the X wagon and the magnets on the frames X beam.

The heat sink unit with its linear guides ('B') are connected to the mount head carrier plate via four partly flexible brackets. These brackets are all different and specifically designed to suite its own position.

The flexible brackets are rigid in the Y-direction on all four guides and in the Z-direction on the two upper guides. In the X-direction the brackets are only rigid on the left side. This arrangement minimizes the effect on the mount head carrier plate from thermal deflections of the heat sink while maintaining precise positioning.

The linear motor is bolted to the heat sink unit with a thin sheet stripe of thermal conductive tape in between.

The positions of the flexible brackets are adjusted in a special mounting tool to give the linear motor the correct distance to the magnet strips.

CAUTION All adjustments of the linear motor are done during manufacturing. Do not try to adjust or remove the flexible brackets.

Located between the linear guides ('A' in Figure 5-2) and the flexible brackets ('B') there are thin plates ('C') shaped like the character 'F'. The purpose of the 'F-plate' is to eliminate turning moment (around Z-axis) from misalignment, thus further lowering the loads.

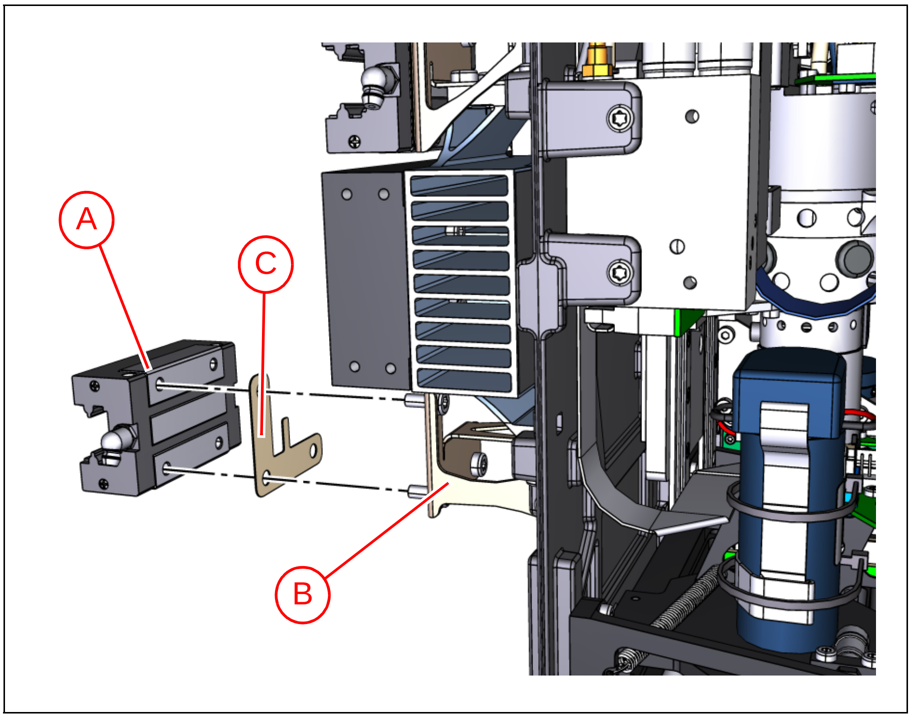


Figure 5-2. F-plate

Mount head carrier plate

This unit comprises the HYDRA unit ('D' in Figure 5-3), Midas Unit ('C'), X-wagon camera ('E'), centering unit ('A'), vacuum valve unit ('B'). All units on the carrier plate are described in their respective chapter in this manual. Also there is a linear encoder attached to the carrier plate.

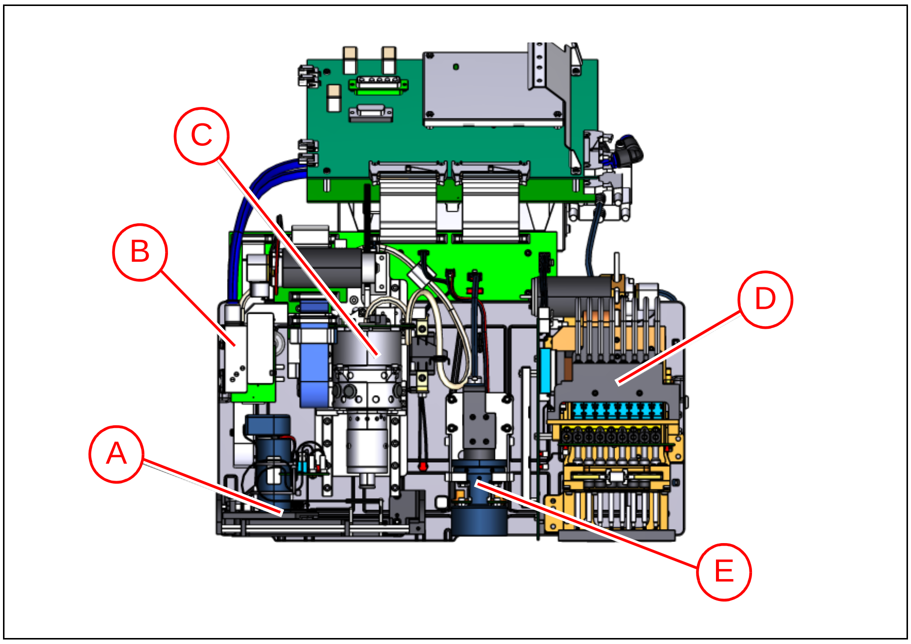


Figure 5-3. Mount head carrier plate (front view).

The linear encoder ('A' in Figure 5-4), is located in the back of the carrier plate and the purpose of the encoder is to keep track of the X wagon's exact position on the X beam. This is accomplished by letting the encoder continuously scan the linear scale that is attached on the X beam.

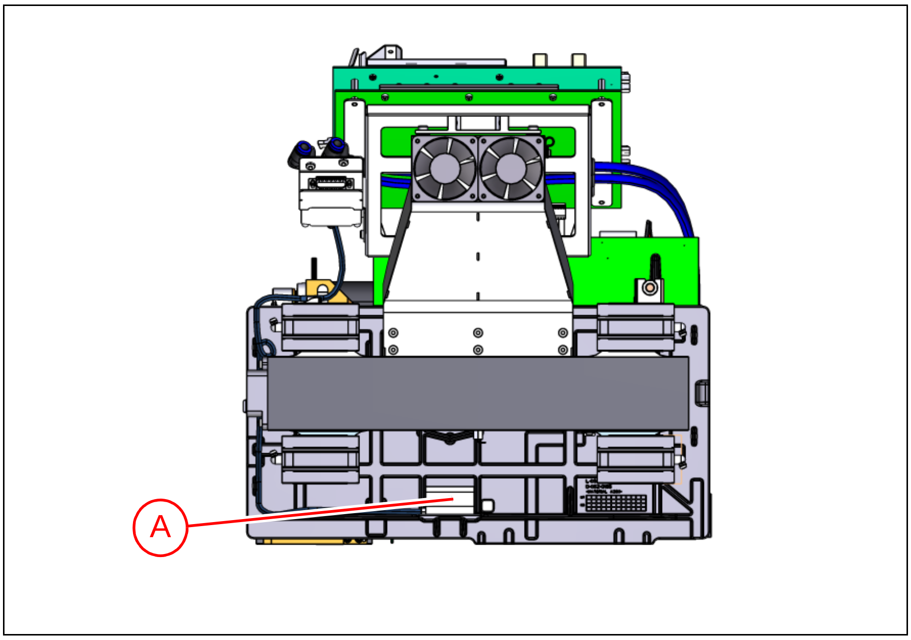


Figure 5-4. Mount head carrier plate (rear view).

The X wagon is designed to keep the necessary 0.8 ± 0.1 mm gap between the encoder and scale along the length of the X beam. Both the scale and the encoder are replaceable.

Fan holder unit.

This unit includes fan holder (heat sink ventilation duct) ('A' in Figure 5-5), fans ('B'), electronic boards ('C') and cable chain connectors.

The X-wagon's linear motor emits heat when it moves along the machine frames X beam. To cool the linear motor, two fans transport heated air through an air duct away from the heat sink ('D') (see section *Heat sink unit*) that is attached to the linear motor coil ('E').

The airflow from the heat sink to the fans is illustrated by the red arrows in Figure 5-5.

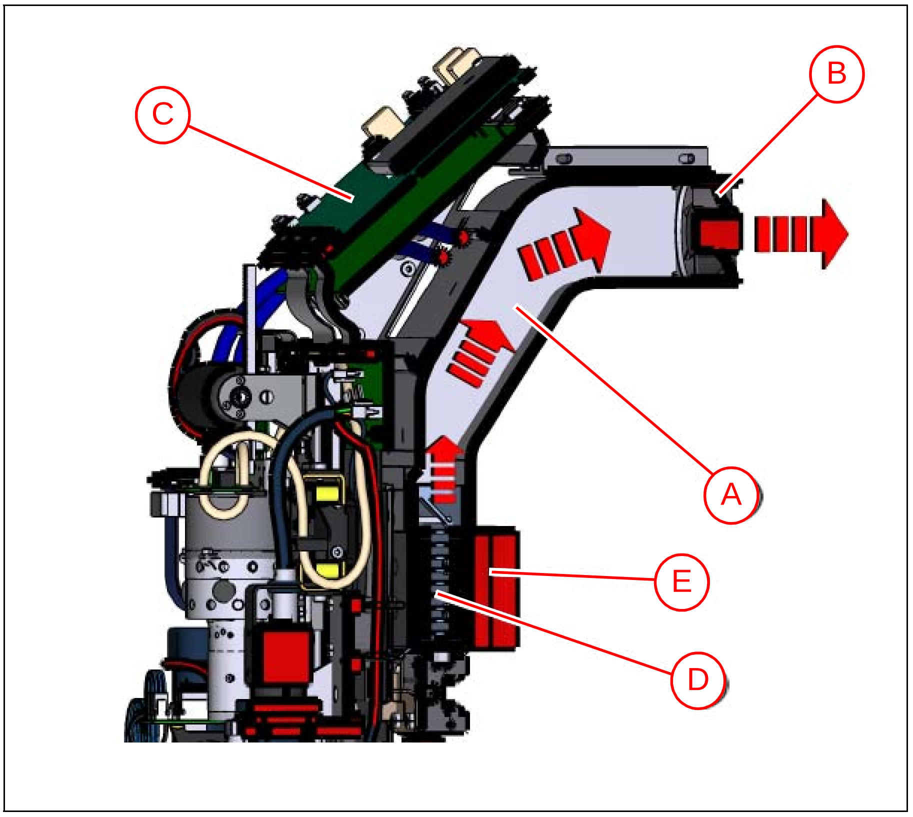


Figure 5-5. Fan holder unit.

X-Beam Parts

X-beam guiding rails

The heat sink unit (see section *Heat sink unit*) is attached to four linear guide blocks ('A' in Figure 5-6), two at the top and two at the bottom of the heat sink unit. The linear guide blocks slide the on the x-beam's integrated guiding rails ('B').

Both the linear guide blocks and the integrated guiding rails are replaceable (see page 5-29 for instructions).

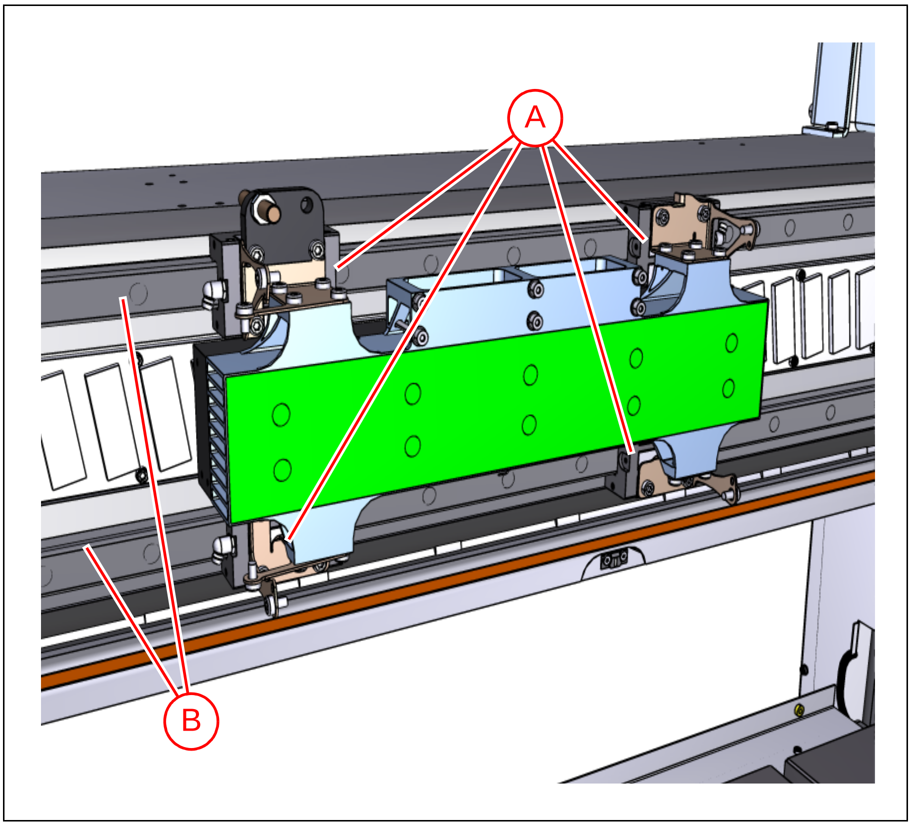


Figure 5-6. Linear guides and integrated guiding rails.

X end stops

The end stop plates ('A' in Figure 5-7) are outfitted with two rubber bumpers each, one for the heat sink unit ('B') and one for the mount head carrier plate ('C'). The plate is designed to decelerate the heat sink unit and the carrier plate equally at a crash, not loading the distances between them. The bumpers shall be adjusted to hit the X wagon simultaneously. To adjust the X end stop bumpers see section *Adjusting the End Stop Bumpers* on page 5-13.

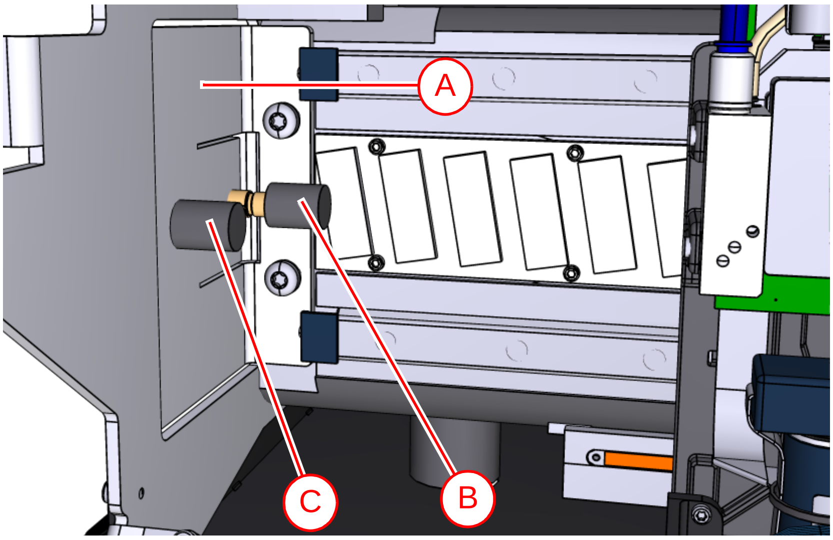


Figure 5-7. X-end stop.

Rubber bumpers on the motor ('A' in Figure 5-8) and on the carrier plate ('B') reduce the forces if the two X wagons should collide (MY100 DX).

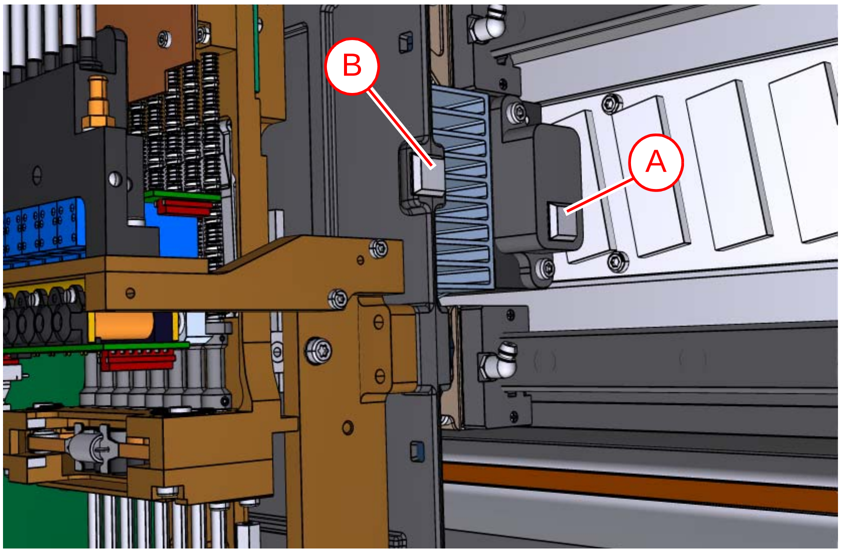


Figure 5-8. X-wagon bumpers.

Always replace the end stop plates and/or rubber bumpers if deformed after a collision.

ATA (Active Thermal Adaption)

The x-wagon's linear motor emits heat when it moves along the machine frames X beam ('A' in Figure 5-9). The emitted heat causes the X beam to slightly alter its shape.

To compensate for position deviations due to the temperature variations in the X beam, the machine is outfitted with a steel strip ('B') that is stretched along the front side of the X beam. See Figure 5-9.

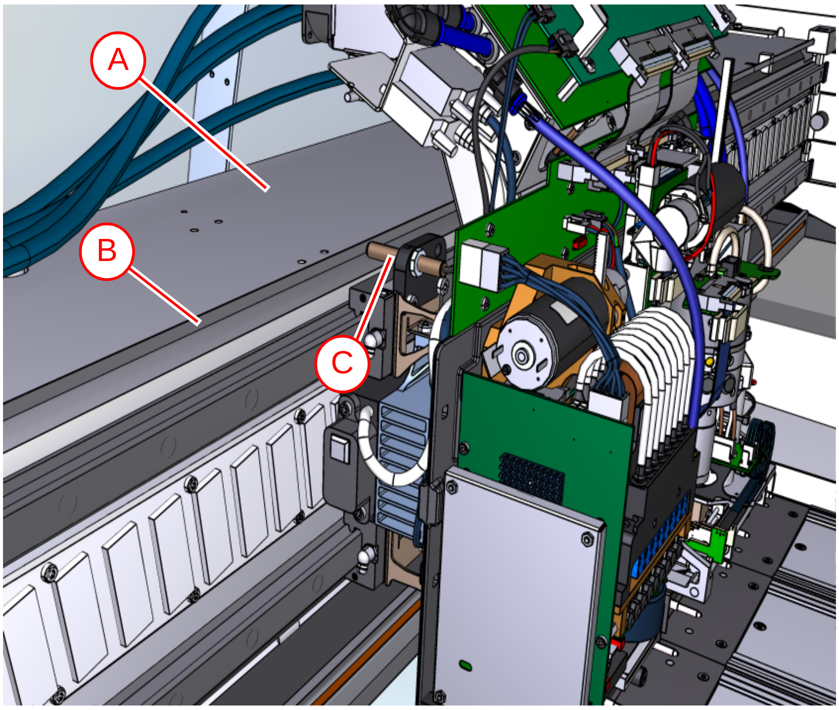


Figure 5-9. ATA (Active Thermal Adaption) system.

Each X wagon is outfitted with a sensor ('C'). This sensor is used to continuously measure the distance from the X wagon to the X beam. This system enables the software to compensate for position deviations caused by the altered shape of the X beam.

Both the sensor and the steel strip are replaceable (see section *Removing and Installing the X-beam Steel Strip* on page 5-33).

Electrical System

The electrical system for the mount heads HYDRA and Midas are described in Chapter 6.

The electrical system for the centering unit is described in Chapter 8.

Schematics

All schematics regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Electrical Parts

XWZB (X Wagon Z Board)

- XWZB (X Wagon Z Board) is located on top of the X wagon and act as a electrical hub on the X wagon. It also contains drivers, filters and standby current generators for some motors.
- Controls the Z, Theta and C movement.
- Controls the X-wagon camera with optional LED light.
- Handles the 3PT1 board. The purpose of the 3PT1 board is to perform electrical verification of components.
- Coverts the incoming 24/48V power to 5V, 12V and 25V.
- Control the vacuum block and its sensors.
- Controls the x-motor fans and temperature sensor.
- Controls the ATA (Active Thermal Adaption) system.

XFCB (X Frame Connector Board)

- XFCB (X Frame Connector Board) is a connection board that connects the cables from the *XBOX* and the *CB3 (Computer Box 3)* to the cable-chain.
- There are two XFCB's in the machine. XFCB left which is connected to the right X wagon and XFCB right which is connected to the left X wagon. Both boards are located on top of the X beam under the top hood.
- Controls some of the safety switches, the vacuum pump and the linear encoder.
- Handles the HYDRA camera and any installed DVC (Dual Vision Camera).
- Connected to and controls the signal tower.
- Monitors the temperature sensor on the X-beam.
- Controls the fan system.

3PT1 (Three Pole Tester 1)

- 3PT1 (Three Pole Tester 1) tests components. It precision tests resistors and capacitors and it can also test various semiconductors.
- The board is located on top of the X wagon.

BB-AD (Burr-Brown AD)

- The previously used Burr-Brown DAC1600 is obsolete and has been replaced with BB-AD (Burr-Brown). This is a small PCB equipped with analog devices AD669 and an OP amplifier inverter.

X-wagon motor

- The linear motors move the X wagon(s) along the machine's X beam. The linear motor consists of two major parts, the coil on the X wagon and the magnets on the frame's X beam.

Cable-chains

Depending on machine model (MY100SX or MY100DX) the MY100 machine can be equipped with one or two cable chains.

- The MY100 DX contains two cable chains (located on top of the X beam) one for each X wagon. One end of the cable chain is connected to the XFCB (X Frame Connector Board) and the other end is connected to the X wagon. The left cable chain connects the right X wagon to the left XFCB and vice versa.
- The main purpose of the cable-chains is to distribute power, control signals, vacuum and pressure to the units on the X wagon.
- There are four different cables and two blue plastic hoses in the each cable-chain.
- The four different cables distribute the following control signals and supply voltages.

  XCHAIN1 : X motor.

  XCHAIN2A : CAN, video, X motor temp.

  XCHAIN2B : X encoder.

  XCHAIN3 : 24 V, 48 V, X fan.
- The two blue plastic hoses in the cable chain supply the mount heads with vacuum and pressure from the vacuum pumps.

CSEL (City Select)

For the computer to be able to communicate with each unit in the machine the unit must have its own address. The address for a particular unit is determined with a control called CSEL (City Select).

- The CSEL code on the XWZB should be set to '0' for the Right X wagon.
- The CSEL code on the XWZB should be set to '1' for the Left X wagon.

Power supply

The power supply for the X movement is generated by the X box amplifiers. See Chapter 11 *Power Supply and Electronic System* for more information regarding the X box.

Functional Test

The following functional tests are possible to perform on the X movement system.

– *Show Transducer Positions* on page 5-12.

Show Transducer Positions

This program shows the C, Theta, X, Y, and Z positions, and the Theta and Z positions for the HYDRA unit, if used. Use this procedure to detect transducer faults or faults in the transducer wiring.

Procedure

1. If you currently run TPSys, select *Restart TPSys* from the *Exit* menu and press the space bar on the keyboard to get to the startup menu.
2. Select *Show Transducers*.
3. When prompted OK to initiate hardware? press <Enter>. The *Show Transducers* window is shown.
   - Transducers named ‘Fi' show the Theta values (in Deg).
   - The YM transducer is shown only if the machine has a tray-wagon magazine, and the HFi and HZ transducers are shown only if the machine has a HYDRA unit.
   - All axes, except for the X axis, are released.

CAUTION! Watch the tool head during movements because the locks can be released, which means that the Z mechanism may go entirely down by its own weight.

4. When ready with *Show Transducers*, exit by pressing any other key than <F1> on the keyboard.
5. Confirm by replying *Yes* in the shown *Exit* dialog box.

WARNING! Make sure there are no fingers in the machine moving areas and press <Enter> to resume the previous positions.

6. If you want to return to the startup menu, press <Space> before TPSys is started.

Adjustments

This section comprises the following adjustment procedures.

- *Adjusting the End Stop Bumpers* on page 5-13.
- *Adjusting the X-wagon Readhead* on page 5-15.

Adjusting the End Stop Bumpers

The end stop plates are outfitted with two rubber bumpers each, one for the heat sink unit and one for the mount head carrier plate. These bumpers should be adjusted to hit the X wagon simultaneously.

Always replace the end stop plates and/or rubber bumpers if deformed after a collision.

---

1. If you are currently running TPSys, select *Exit* > *Exit TPSys.*
2. Press the emergency stop button down.
3. Open the upper top hood by gently pressing a pointed object, for example an M6 Allen key through the holes and releasing the lock on each side of the upper hood. See Figure 5-10.

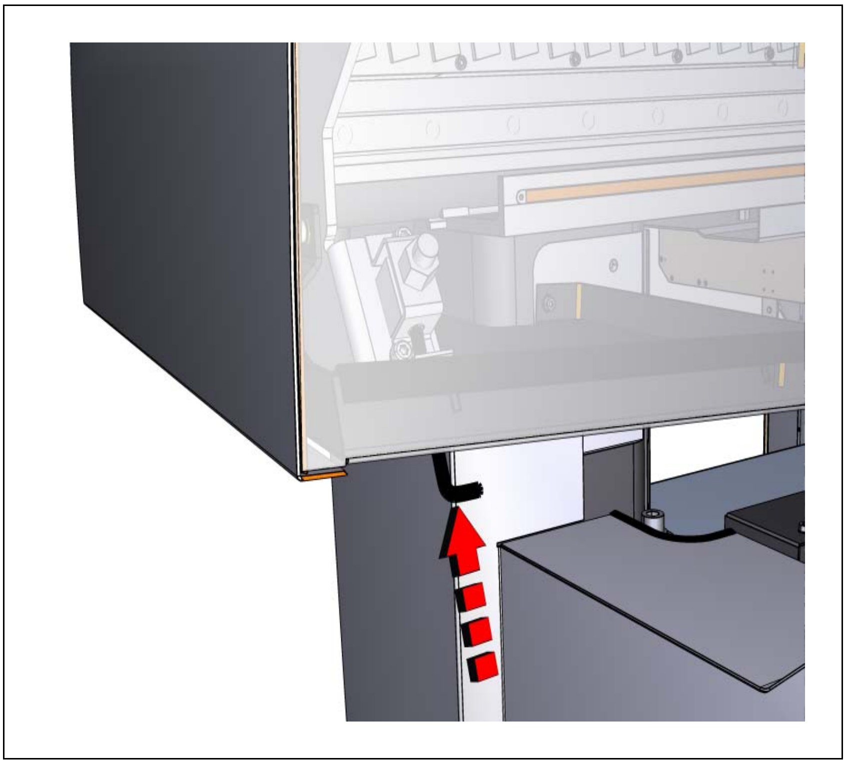


Figure 5-10. Opening the top hood.

4. Move the X wagon by hand to the end stop plate ('A' in Figure 5-11) and the end stop bumpers ('B') and ('C').

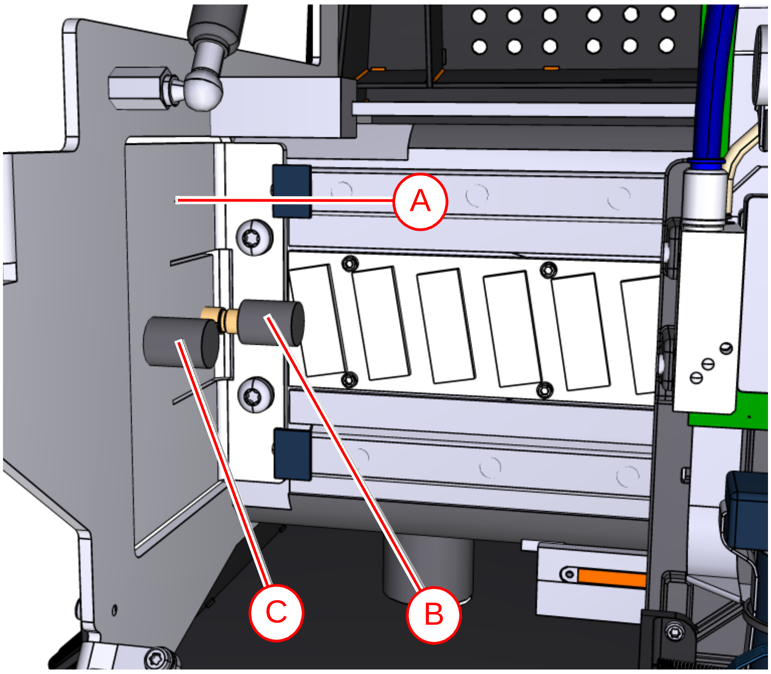


Figure 5-11. End stop bumpers.

5. Use a large flat screwdriver to adjust the bumper closest to the X beam (see Figure 5-12).

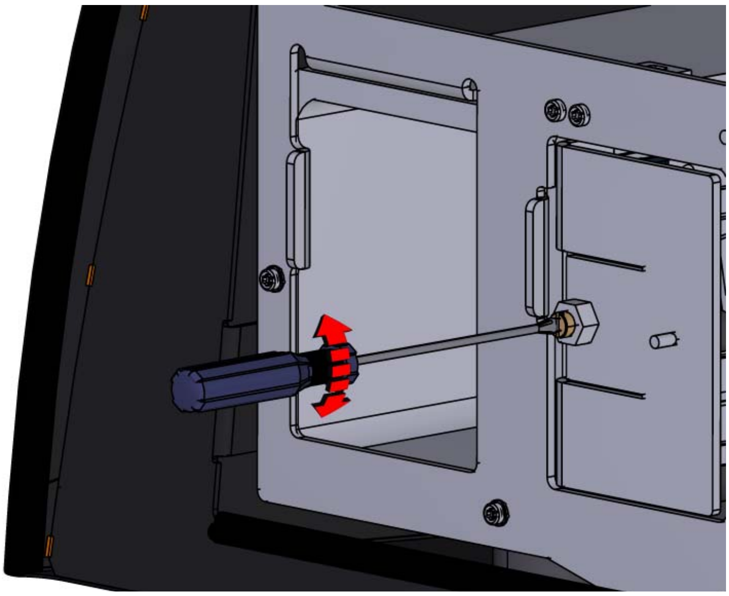


Figure 5-12. Adjusting the end stop bumper.

Adjust the bumper so that both bumpers meet their respective parts of the X wagon simultaneously.

6. If necessary, repeat the procedure on the other side.

Adjusting the X-wagon Readhead

This section describes how to adjust the X-wagon readhead ('A' in Figure 5-13). Depending on machine model the X beam is equipped with one or two reference marks ('B'). When the X-wagon readhead passes the reference mark it registers a datum position for the X wagon. Follow the procedure below to adjust the readhead.

1. Press the emergency stop button down.
2. Open the upper top hood by gently pressing a pointed object, for example an M6 Allen key through the holes and releasing the lock on each side of the upper hood. For details see step 3 in section *Adjusting the End Stop Bumpers* on page 5-13.
3. Manually move the X wagon to the leftmost position and then move it slowly to the right over the reference mark.
   - Monitor the readhead LED indicator (through the opening in the X wagon) while moving the X wagon ('A' in Figure 5-14).
   - The readhead is adjusted correctly if the LED is indicating red when it passes the reference mark (left to right direction).

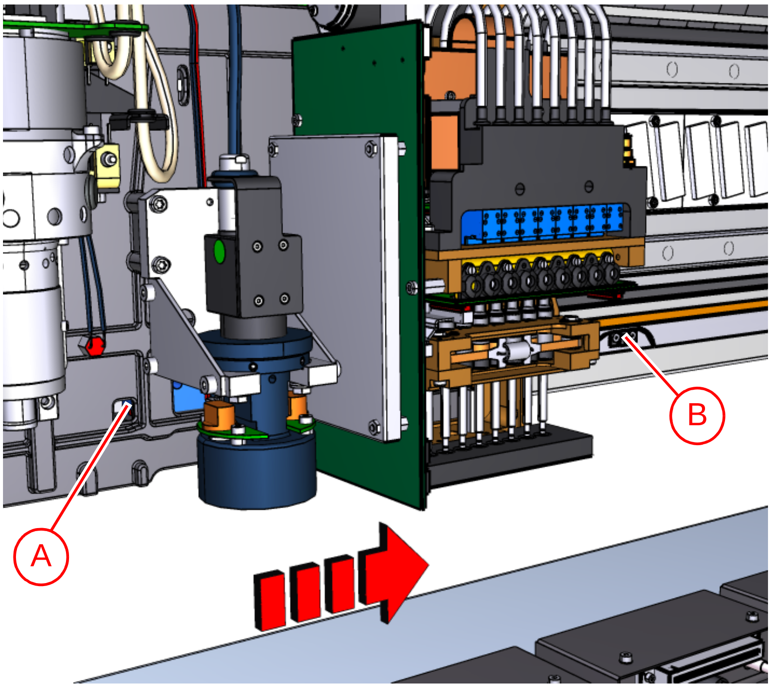


Figure 5-13. Adjusting the X-wagon readhead.

4. If the readhead does not indicate red when it passes the reference mark (left to right direction), then adjust the reference mark by using an Allen key to turn one of the set screws ('A' in Figure 5-14) on the reference mark anti-clockwise 1/8 turn.

☞ It is not important what color the LED indicates on the way back (right to left direction).

---

5. Repeat this procedure until the LED indicates red when it passes the reference mark (left to right direction).

☞ If the screw is close to fall out of its threads then continue the procedure on the other screw on the reference mark.

---

6. Repeat the procedure on the other reference mark (MY100 DX).
7. Verify the adjustment by running the burnin program, as described in the following section.

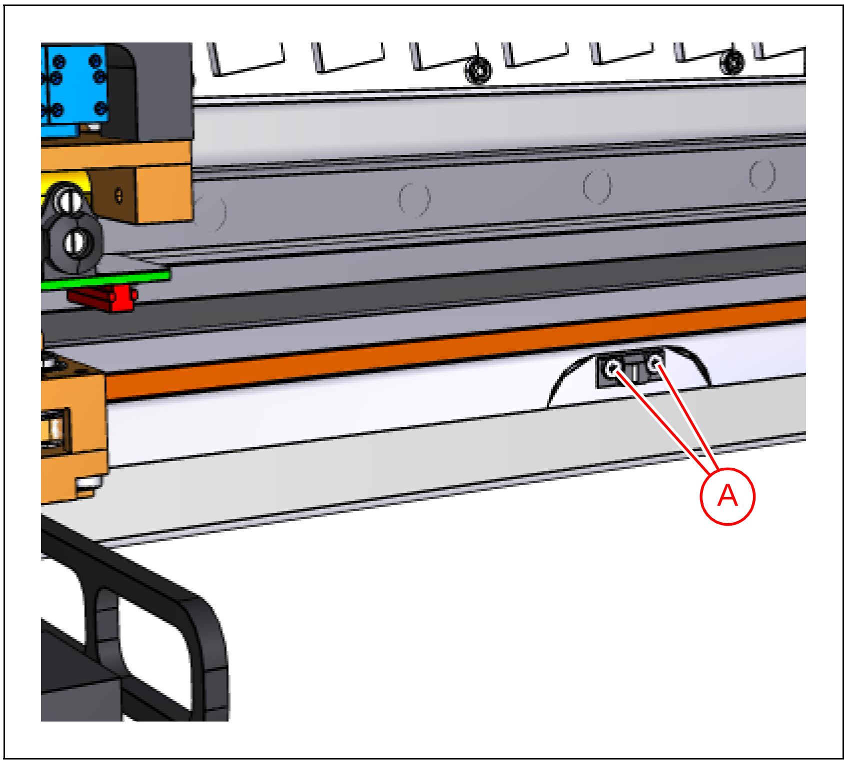


Figure 5-14. Adjusting the X-wagon readhead.

Verify Readhead adjustment

1. Close the top hood.
2. Release the emergency stop button.
3. If you are currently running TPSys, then select *Exit TPSys* from the *Exit* menu.
4. Start the *Burnin program* by entering the command `Burnin` at the Linux prompt ($).
5. Set the field *Check Period* to '1'.
6. Select *Start Burnin* and press <Enter>.
7. Verify that the LED flashes red when it passes the reference mark (left to right direction).

If necessary, adjust the reference mark as follows.

1. Stop the *Burnin Program* by pressing <Esc>.
2. Press the emergency stop button down.
3. Repeat steps 3 to 5 in previous section *Adjusting the X-wagon Readhead*.
4. When satisfied, verify the readhead adjustment again.
5. Repeat the procedure on the second reference mark (MY100 DX).

Adjusting the ATA Sensors

Before commencing this adjustment, make sure that the machine is cold. It should have been idle (switched off or not running) for at least 1.5 hours.

1. Press the emergency stop button down.
2. Start adjusting the ATA sensor ('A' in Figure 5-15) on the left X wagon (MY100 DX) or right X wagon (MY100 SX). Place the X wagon in the middle of its two outer positions on the X beam.
3. Adjust the ATA sensor to a value that is between 650 - 850, preferable value is 750.
4. Move the X wagon to the leftmost position and then move it slowly to the right.
   – Monitor the ATA sensor value while moving the X wagon and make sure that the value stays between 650 - 850.
5. If the value exceeds this tolerance somewhere along the ATA strip, then the ATA sensor position needs to be adjusted as follows.
   – Loosen the locking nut ('B' in Figure 5-14) somewhat and carefully adjust the ATA sensor ('A') until the value is within the stated interval (650 - 850).

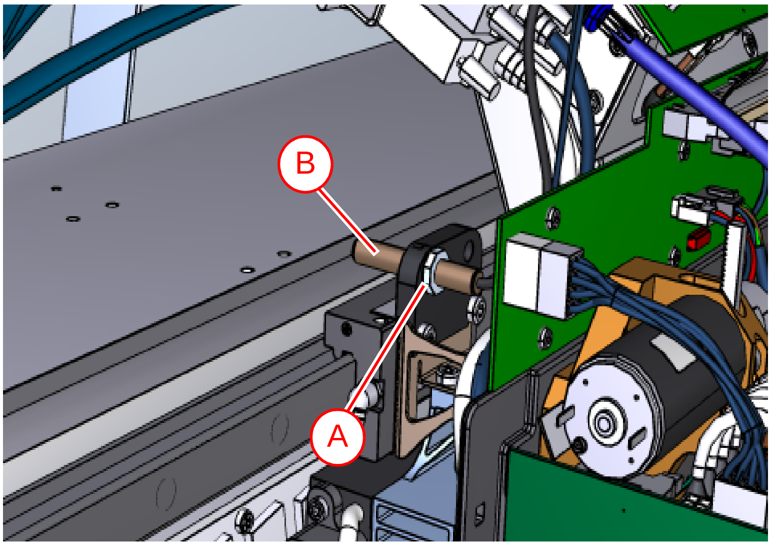


Figure 5-15. Adjusting the ATA sensor position.

6. Continue to move the X wagon towards the end position and monitor the value, adjust if necessary.

   If the ATA sensor position can not be adjusted within he stated interval (650 - 850), then try to adjust the steel strip spacers ('A' in Figure 5-27) to fit better in the recesses ('B') located in the front of the X beam.

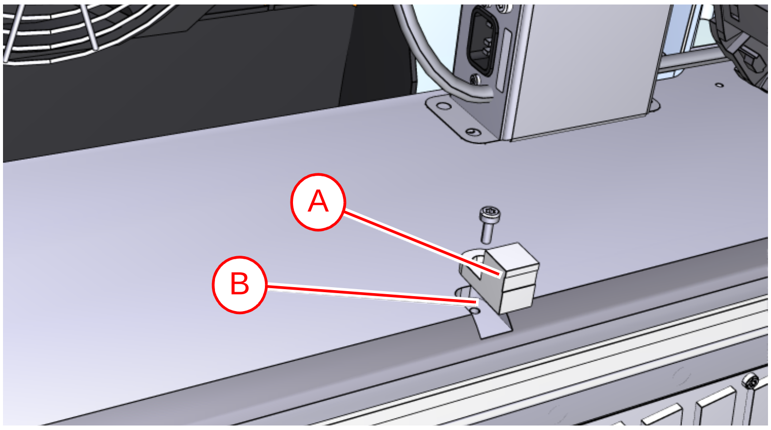


Figure 5-16. Adjusting the steel strip spacers.

7. Perform the same procedure on the second X wagon (MY100 DX).

Installation and Removal

This section comprises the following installations and removal procedures.

DANGER! The following maintenance steps are performed in the vicinity of permanent magnets. Personnel wearing pace-makers must be careful in the vicinity of permanent magnets.

CAUTION! Do not approach permanent magnets when carrying objects made of iron, steel or nickel.

CAUTION! Do not wear watches near permanent magnets since they can be damaged.

CAUTION! Do not bring magnetic data media, check or credit cards near permanent magnets. The data on the data media may be erased by the magnetic field.

Removing and Installing the Mount Head Carrier Plate

WARNING there are very strong magnetic fields near the magnetic strips. The magnets should always be covered when they are being handled, and when they are stored outside the machine.

Requirements

- Standard tools.
- Magnet cover (L-050-0073).

  If the magnet cover is not available, it is still possible to remove the magnets by using an, at least 10mm thick, non-magnetic material to cover the magnets. A few layers of corrugated cardboard held in place by thin steel strips is a non-expensive solution for storage and transport.

Removing the mount head carrier plate

The carrier plate can be removed from the machine by following the procedure below.

1. If you are currently running TPSys, select *Exit* > *Exit TPSys.*
2. Press the emergency stop button down.
3. Open the upper top hood by gently pressing a pointed object, for example an M6 Allen key through the holes and releasing the lock on each side of the upper hood. For details see step 3 in section *Adjusting the End Stop Bumpers* on page 5-13.
4. Remove the front glass by removing the screws at each end of the metal beam holding the front glass.
5. Move the X wagon to a position on the X beam where it is easy to get access to carrier plate screws, located on each side of the X wagon.
6. Disconnect all cables and vacuum tubes connecting the carrier plate to the fan holder unit.

7. There is a total of six screws attaching the carrier plate ('B' in Figure 5-17) to the heat sink unit. Two in the upper left corner and two in the lower left corner ('A'). On the opposite side of the carrier plate there is only one screw in each corner.

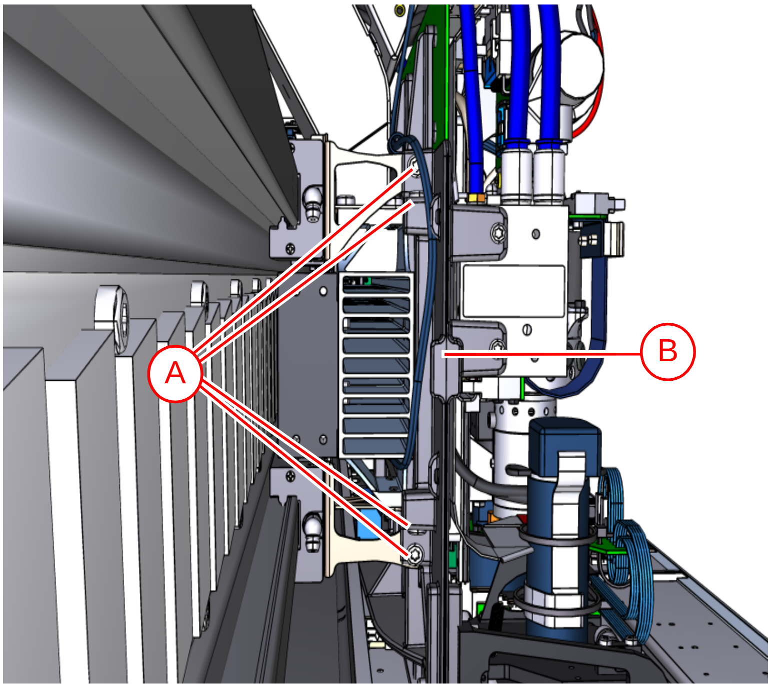


Figure 5-17. Removing the carrier plate.

8. Start by removing the three screws in the lower part of the carrier plate. Two screws on the left and one on the right side of the X wagon.
9. Continue by carefully removing the three screws holding the upper part of the carrier plate.
10. Carefully remove the mount head carrier plate.

Installing the mount head carrier plate

Refer to removal procedure in reverse order.

After reassembly there is normally no need for adjusting the mount head carrier linear encoder that is attached to the back of the carrier plate, unless it has been moved from its position.

Removing and Installing the Heat Sink Unit

WARNING there are very strong magnetic fields near the magnetic strips. The magnets should always be covered when they are being handled, and when they are stored outside the machine. At least one magnet strip must be removed from the X beam before removing the heat sink unit. ***Never*** *try to place the heat sink unit on the linear guides in a position where the magnets still are mounted.*

Requirements

– Standard tools.

– Magnet cover (L-050-0073).

If the magnet cover is not available, it is still possible to remove the magnets by using an, at least 10mm thick, non-magnetic material to cover the magnets. A few layers of corrugated cardboard held in place by thin steel strips is a non-expensive solution for storage and transport.

Removing the heat sink unit

The heat sink unit can be removed from the machine by following the procedure below.

1. If you are currently running TPSys, select *Exit* > *Exit TPSys.*
2. Press the emergency stop button down.
3. Open the upper top hood by gently pressing a pointed object, for example an M6 Allen key through the holes and releasing the lock on each side of the upper hood. For details see step 3 in section *Adjusting the End Stop Bumpers* on page 5-13.
4. Remove the mount head carrier plate by following the procedure *Removing and Installing the Mount Head Carrier Plate* on page 5-21.
5. Choose to remove a magnetic strip where it will be easy to get access to the screws that attaches the flexible brackets ('D' in Figure 5-18) to the linear guides ('E'). Use a magnet cover (L-050-0073 available from MYDATA) to cover the magnetic strip. For details see section *Removing and Installing the Magnetic Strips* on page 5-25.
6. Move the X wagon to the position on the X beam where the magnetic strip has been removed.

7. Start by removing the six screws ('A') in the two lower flexible brackets.

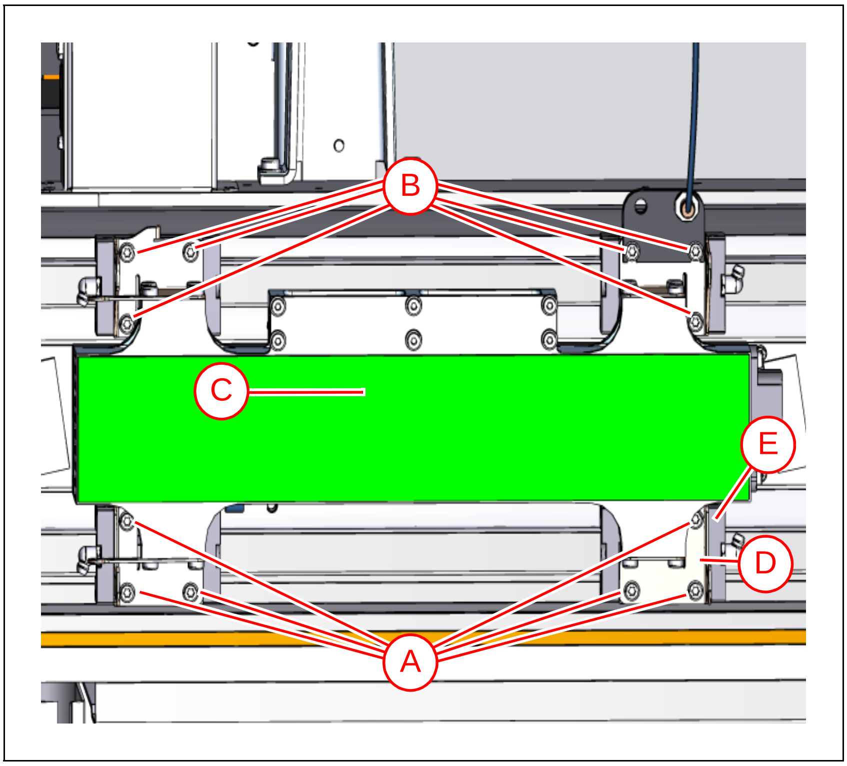


Figure 5-18. Removing the heat sink unit.

8. Continue by carefully removing the six screws ('B') holding the upper part of the heat sink unit.

9. Carefully remove heat sink unit ('C').

Installing the heat sink unit

Refer to removal procedure in reverse order.

Removing and Installing the Magnetic Strips

WARNING there are very strong magnetic fields near the magnetic strips. The magnets should always be covered when they are being handled, and when they are stored outside the machine.

Requirements

- Standard tools.
- Magnet cover (L-050-0073).

  If the magnet cover is not available, it is still possible to remove the magnets by using an, at least 10mm thick, non-magnetic material to cover the magnets. A few layers of corrugated cardboard held in place by thin steel strips is a non-expensive solution for storage and transport.

Removing the magnetic strips

Removal of the magnet strips must always start at either end of the X beam since the strips have overlapping joints.

1. If you are currently running TPSys, select *Exit* > *Exit TPSys.*
2. Press the emergency stop button down.
3. Open the upper top hood by gently pressing a pointed object, for example an M6 Allen key through the holes and releasing the lock on each side of the upper hood. For details see step 3 in section *Adjusting the End Stop Bumpers* on page 5-13.
4. Remove the front glass by removing the screws at each end of the metal beam holding the front glass.
5. Use a magnet cover (L-050-0073 available from MYDATA) to cover the magnetic strip nearest the end stop plate.
6. Loosen the two screws ('A' in Figure 5-19) that attach the end stop plate ('B') to the X beam.

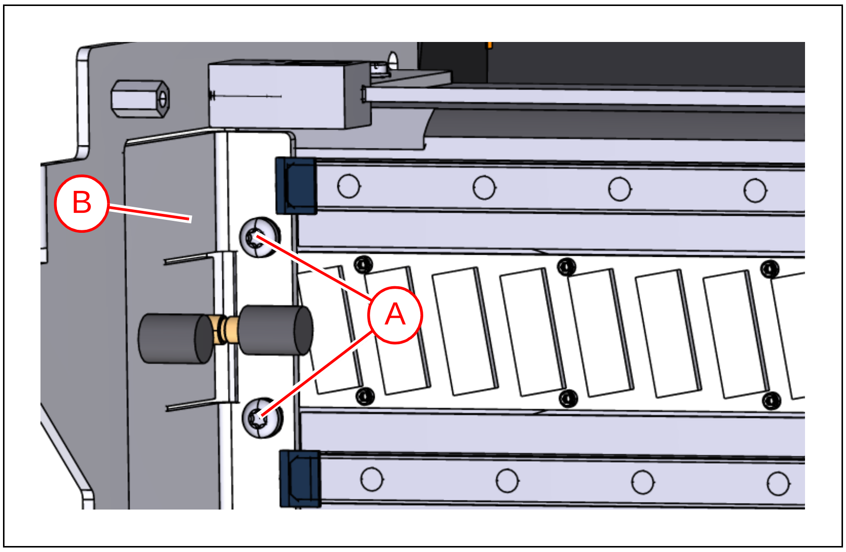


Figure 5-19. Removing the end stop plate.

7. Remove the end stop plate.

8. Loosen the ten screws ('A' in Figure 5-20) that attach the magnetic strip ('B') to the X beam.

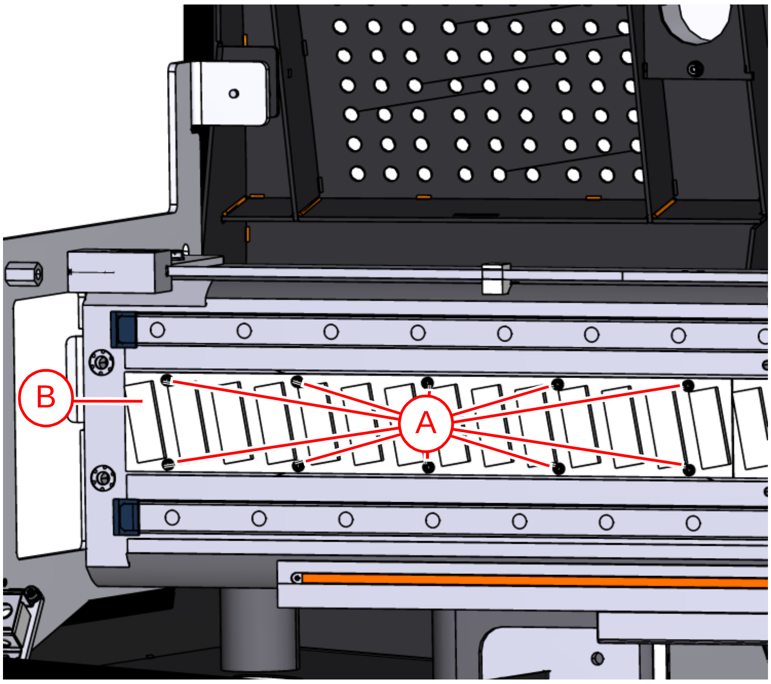


Figure 5-20. Removing the magnetic strips.

9. Remove the magnet strip and keep the magnets covered.

Installing the magnetic strips

1. Place the covered Magnetic strip on the X beam and hold it firmly against the beam while sliding it into its position. During final adjustment it shall be attracted by the adjacent magnet. If it is instead repelled it must be lifted off and rotated 180°.

NOTE: It is free to mount the first magnetic strip either way.

2. Secure with the screws. Tighten the screws.
3. Re-install the End stop plates.
4. Secure with the screws. Tighten the screws.

Removing and Installing the Linear Guide Blocks

The X linear guide system consists of four linear guide blocks of ball type per X wagon and two linear guide rails. The following procedure describes how to remove the linear guide blocks. For instructions on removing the linear guide rails, see section *Removing and Installing the Guiding Rails* on page 5-29.

1. If you are currently running TPSys, select *Exit* > *Exit TPSys.*
2. Press the emergency stop button down.
3. Open the upper top hood by gently pressing a pointed object, for example an M6 Allen key through the holes and releasing the lock on each side of the upper hood. For details see step 3 in section *Adjusting the End Stop Bumpers* on page 5-13.
4. Remove the front glass by removing the screws at each end of the metal beam holding the front glass.
5. Remove the end stop plate (located at the far end of the X beam).

   For details, refer to step 7 in section *Adjusting the End Stop Bumpers* on page 5-13.
6. Move the X wagon by hand towards the end of the X beam.
7. Cover and then remove at least one magnet strip. Refer to section *Removing and Installing the Magnetic Strips* on page 5-25 for instructions.
8. Move the X wagon by hand to a position where there are no magnets behind the X wagon.
9. Remove the screws holding the linear guide block and slide the guide block ('A' in Figure 5-21) through the opening in the end stop plate.

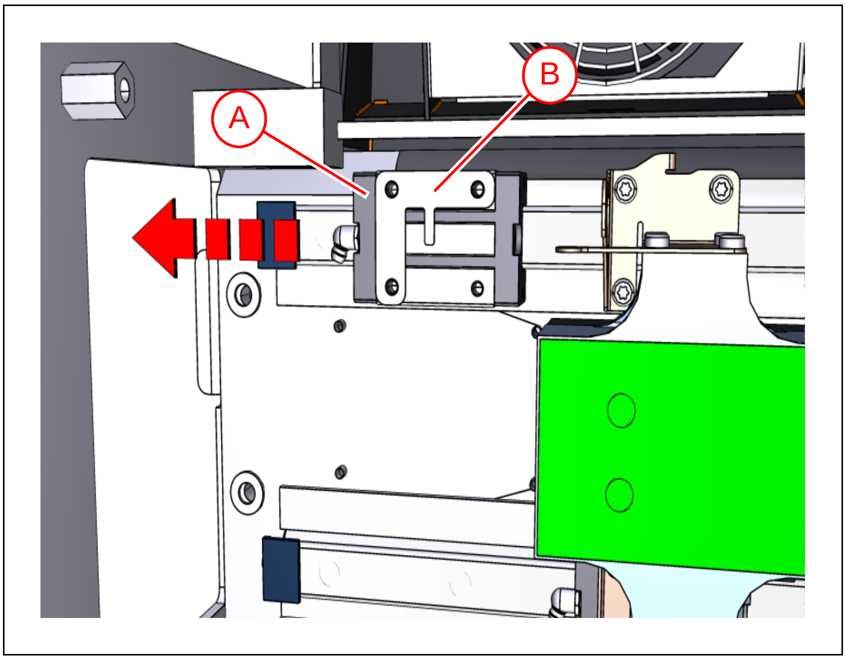


Figure 5-21. Removing linear guide block.

10. Collect the F-plate ('B').

Do not move the X wagon until the linear guide block is reinserted or replaced.

Installing the linear guide blocks

1. Refer to removal procedure in reverse order.
2. When reattaching the linear guide blocks note that on top of the **upper** linear guide blocks ('A' in Figure 5-22), are groove marks ('B') which are used as guide surfaces for the mount head carrier plate and **must** face upwards when installed (see Figure 5-22).

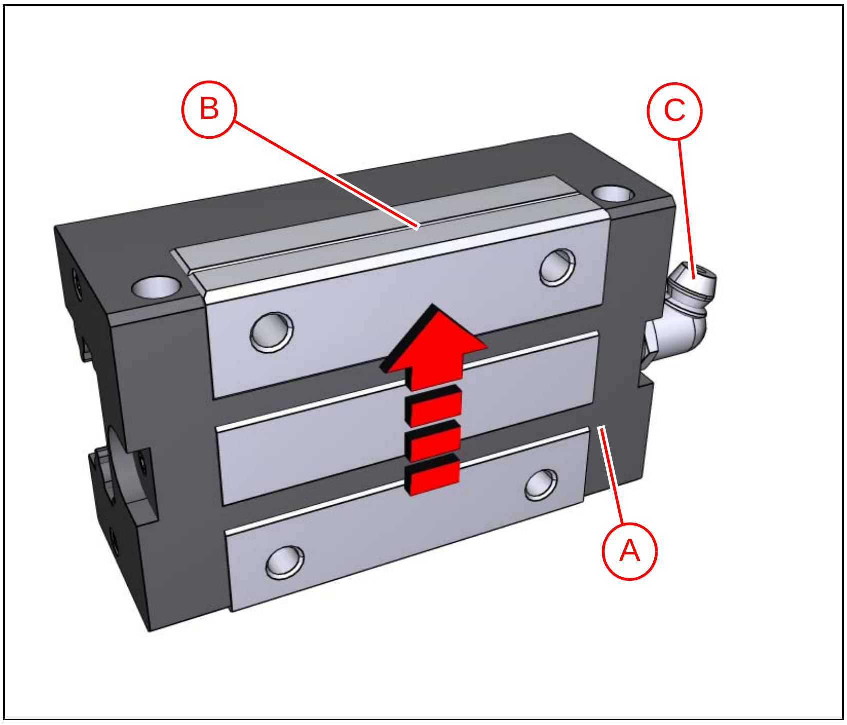


Figure 5-22. Upper right linear guide block with groove mark.

3. Make sure that the grease fittings ('C') are pointing out from the X wagon. And that the grease fitting is pointing upwards.
   - If necessary, the **lower** linear guide blocks can be rotated 180° to get the grease fitting correctly located.
4. If it is difficult to fit the F-plate, slightly loosen the second guide block on the same guiding rail.

Removing and Installing the Guiding Rails

WARNING there are very strong magnetic fields near the magnetic strips. The magnets should always be covered when they are being handled, and when they are stored outside the machine.

***All** magnet strips have to be covered before a guiding rail is removed or mounted.*

Requirements

– Standard tools.

– Dynamo metric wrench.

– Special rails mounting tool.

– Magnet cover (L-050-0073).

If the magnet cover is not available, it is still possible to remove the magnets by using an, at least 10mm thick, non-magnetic material to cover the magnets. A few layers of corrugated cardboard held in place by thin steel strips is a non-expensive solution for storage and transport.

Removing the guiding rails

The following procedure describes how to remove the rails.

1. If you are currently running TPSys, select *Exit* > *Exit TPSys.*
2. Press the emergency stop button down.
3. Open the upper top hood by gently pressing a pointed object, for example an M6 Allen key through the holes and releasing the lock on each side of the upper hood. For details see step 3 in section *Adjusting the End Stop Bumpers* on page 5-13.
4. Use magnet covers (L-050-0073 available from MYDATA) to cover the all the magnetic strips.
5. Remove the mount head carrier plate. Refer to section *Removing and Installing the Mount Head Carrier Plate* on page 5-21 for instructions.
6. Remove the heat sink unit. Refer to section *Removing and Installing the Heat Sink Unit* on page 5-23 for instructions.
7. Remove the linear guide blocks. Refer to section *Removing and Installing the Linear Guide Blocks* on page 5-27 for instructions.

8. All screws ('C' in Figure 5-23) in the rails ('B') are covered with plastic protection caps ('A').

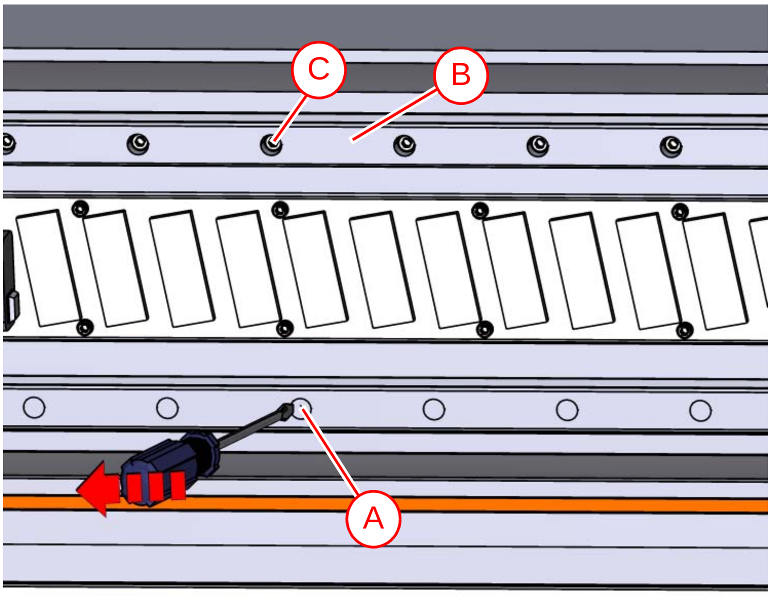


Figure 5-23. Remove protection caps.

Use a thin screwdriver or pointed object to remove all protection caps. The caps can not be reused and should be replaced if removed.

9. Use a T25 torx key to remove all screws from the guiding rail.

Be careful not to drop the guiding rail when the last screws are removed.

Installing the guiding rails (using special mounting tool)

☞ It is recommended to use a special guiding rails mounting tool when installing the guiding rails.

1. Make sure that the guiding rails are correctly aligned and that the datum surface on the guiding rail face their respective shoulder on the X beam.
2. Use the special guiding rail mounting tool to fixate the guiding rail on the X beam.
3. Use a T25 torx key to tighten all screws on the guiding rails.
4. Use a flat piece of hard plastic and press new caps into the guiding rail bolt holes. Make sure that they are flush with the guiding rail top face.
5. To finish the installation, continue by performing the removal procedure in reverse order.

Installing the guiding rails (without special mounting tool)

If the special mounting tool is not available it is still possible to mount the guiding rails according to the following instruction:

1. Place the guiding rail on the X beam and secure with the screws just very loosely tightened.
2. Press the upper guiding rail ('A' in Figure 5-24) against the X-beam shoulder ('B') and tighten the screws just enough to make it rest on the mounting face without play.
3. Perform the final tightening, starting with the screw at the left end and proceeding screw by screw to the right end. See Figure 5-24.

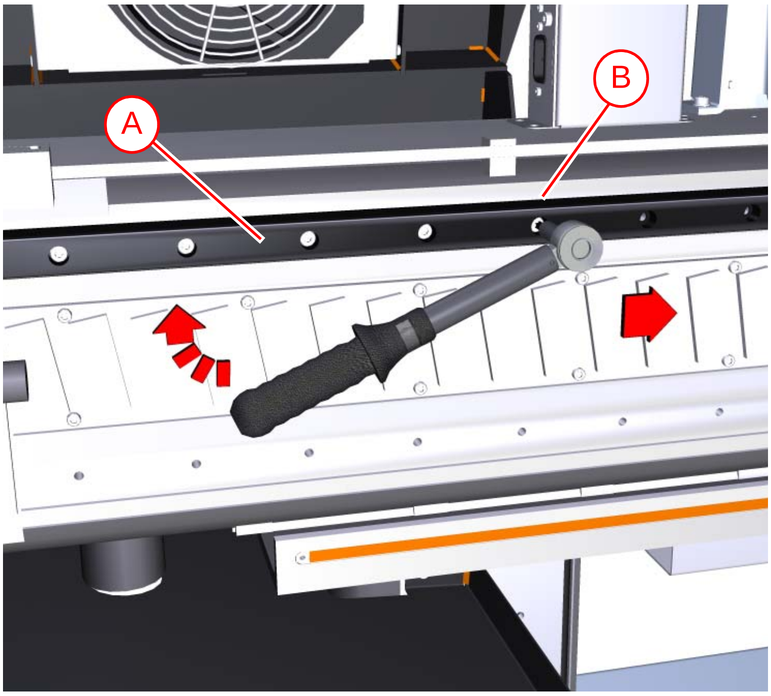


Figure 5-24. Fastening the upper guiding rail.

This way the torque on the screw head presses the guiding rail against the X-beam shoulder.

4. Use the same procedure on the lower guiding rail, but this time start from the right end of the X beam.
5. To finish the installation, continue by performing the removal procedure in reverse order.

Removing and Installing the X-beam Steel Strip

This section describes how to replace x-beam steel strip. The steel strip is stretched in front of the X beam. The steel strip is pre mounted at delivery, but the steel strip can be replaced if the belt is worn or damaged.

The steel strip kit is available with two different belt lengths. One kit includes a shorter steel strip that is to be used in the MY100-10 machine and the other kit includes a longer steel strip that is to be used in the MY100-14 machine. In each kit there are screws provided to attach the end brackets to the frame gable. There are also two steel strip spacers in the kit.

WARNING Only use the screws provided in the kit. If the screws are too short the steel strip might still be stretched when the bracket is disengaged.Using screws with the wrong length may cause personal injury and/or damage to the machine.
Always use safety goggles when mounting/dismounting the x-beam steel strip.
All calibrations has to be re-done after the steel strip has been replaced.

Requirements

– Standard tools.

– Safety goggles.

– Dynamo metric wrench.

Opening the top hood cover

1. If you are currently running TPSys, select *Exit* > *Exit TPSys.*
2. Press the emergency stop button down.
3. Open the upper top hood by gently pressing a pointed object, for example an M6 Allen key through the holes and releasing the lock on each side of the upper hood. For details see step 3 in section *Adjusting the End Stop Bumpers* on page 5-13.
4. Remove the front glass by removing the screws at each end of the metal beam holding the front glass.

Dismounting the steel strip

CAUTION! Wear eye protection (safety goggles) when performing the following steps.

1. Make sure that the two screws ('A' in Figure 5-25) holding the end bracket ('C'), and the two screws securing the steel strip ('D') has the correct length by checking that the screws are visible through the inspection holes ('B') in the end brackets.

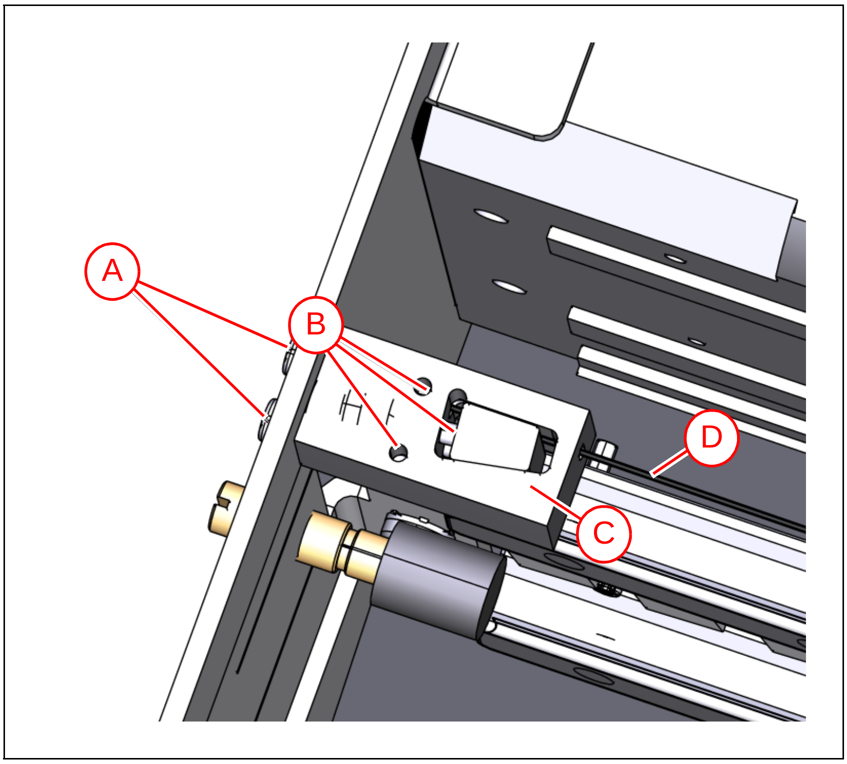


Figure 5-25. Opening the upper machine cover.

2. On one of the end brackets, carefully loosen the screws ('A') approximately five turns.
3. Loosen and remove the screws from the opposite end bracket.
4. Remove the screws completely from the first end bracket.

Mounting the steel strip

1. Place the steel strip ('A' in Figure 5-26) and the wedge ('B') in the first bracket. Make sure that the steel strip is fully engaged and reaches the wall in the end bracket.

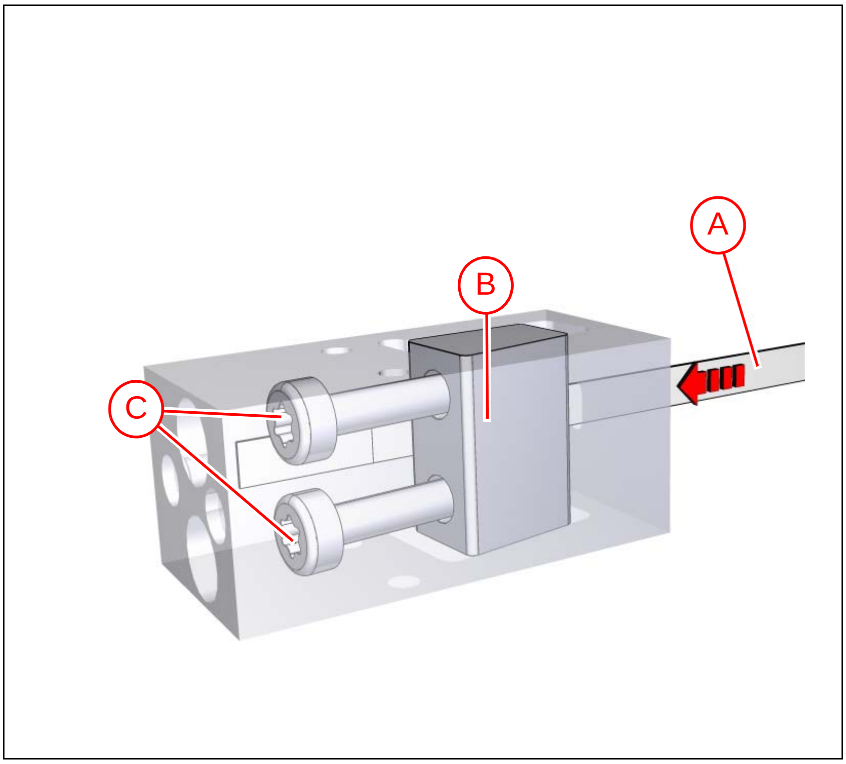


Figure 5-26. Mounting the steel strip.

This will ensure that the steel strip length is correct.

2. Use a dynamo metric wrench to tighten the screws ('C') gradually to the prescribed torque 7 Nm. The steel strip shall be in line with the end bracket.

3. If necessary, replace the two steel strip spacers ('1' in Figure 5-27) in the recesses ('2') located in the front of the X beam.

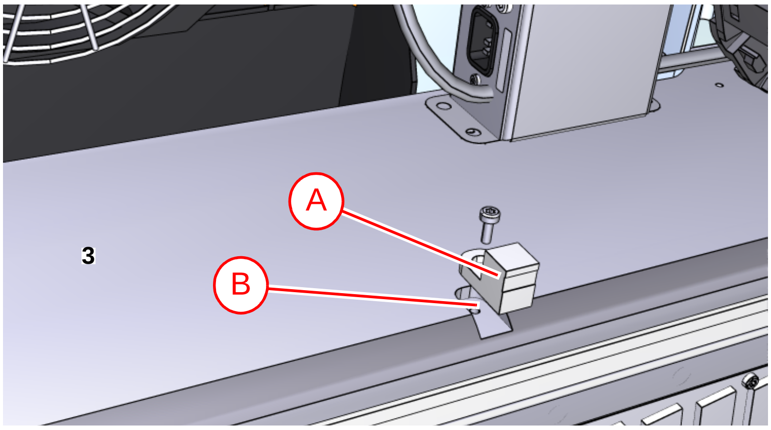


Figure 5-27. Mounting the steel strip spacers.

4. Use two screws to clamp the first end bracket to the machine frame gable.

The screws must reach the inspection holes in the end bracket.

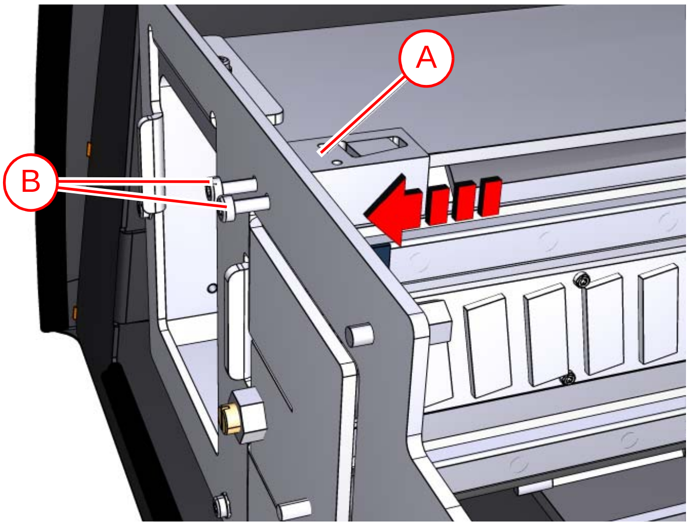


Figure 5-28. Attach the end bracket.

5. Make sure that the steel strip is not twisted. Clamp the other end stop bracket to the opposite machine frame gable.
6. Check the inspection holes to assure that the screws are long enough.

   The steel strip tension will be correct when both end stop brackets are tightly secured against the machine frame gable.

   The total stretch of the steel strip will be approximately 9mm for the X10 machine and 20mm for the X14 machine.
7. Re-insert the front glass.

Removing and Installing the Cable Chain

This section describes how to replace the X-wagon cable chain. The cable chain is mounted on top of the X beam. The cable chain is pre mounted at delivery, but the cable chain can be replaced if the cable chain is worn or damaged.

Depending on machine model (MY100SX or MY100DX) the MY100 machine can be equipped with one or two cable chains. The MY100DX model is outfitted with two cable chains, one for each X wagon.

The cable chains can also be of different lengths. A shorter cable chain is available for the MY100 machine with 10 magazine slots and a longer cable chain that is to be mounted on the machine model with 14 magazine slots.

One end of the cable chain is connected to the XFCB (X Frame Connector Board) and the other end is connected to the X wagon. The left cable chain connects the right X wagon to the left XFCB and vice versa.

For more information about the cable chain see section *Cable-chains* on page 5-11.

CAUTION! Beware of the sharp edges on the x-beam steel strip when performing the following steps.

The instruction below describe how to remove and install the cable chain connected to the right X wagon. The procedure for removing or installing the cable chain connected to the left X wagon is identical but mirrored.

Requirements

– Standard tools.

Opening the top hood cover

1. If you are currently running TPSys, select *Exit* > *Exit TPSys.*
2. Press the emergency stop button down.
3. Open the upper top hood by gently pressing a pointed object, for example an M6 Allen key through the holes and releasing the lock on each side of the upper hood. For details see step 3 in section *Adjusting the End Stop Bumpers* on page 5-13.

Dismounting the cable chain

1. Remove the four cable connectors from the left XFCB (X Frame Connector Board). See Figure 5-29.

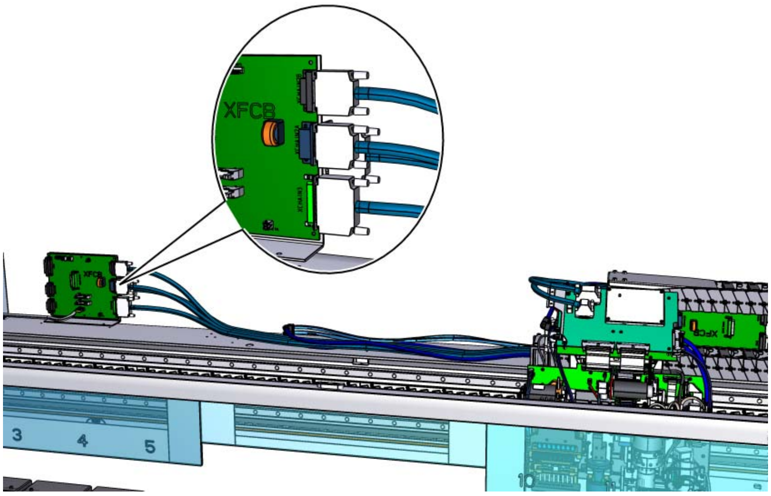


Figure 5-29. Remove cable connectors.

2. Open the cable clamp holding the cables in position on top of the X beam.
3. On top of the X beam, disconnect the vacuum and pressure hoses from the hose fittings ('A' in Figure 5-29).
   – Press the blue clamping ring ('B') on the hose fitting to remove the hose.

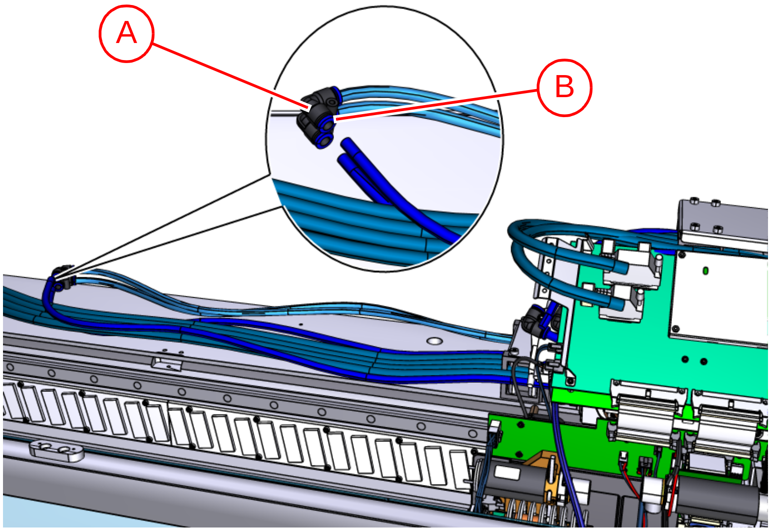


Figure 5-30. Disconnect the vacuum and pressure hoses.

4. In the X beam end of the cable chain, remove the four screws ('A' in Figure 5-31) from the clamp ('B') that attach the cable chain to the X beam.

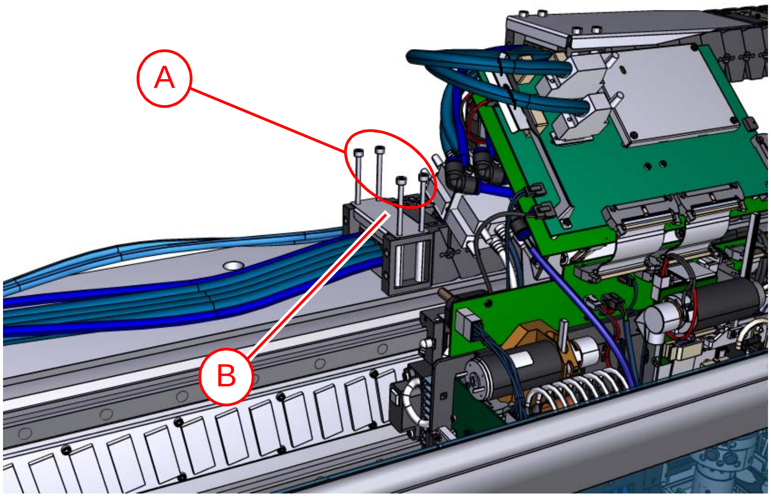


Figure 5-31. Detach cable chain from X beam.

5. To make more space, move the X wagon by hand to the far end of the X beam.
6. Cut the cable ties ('A' in Figure 5-32) fixating the cables to the bracket on the XWZB (X Wagon Z Board).
7. Remove the two cable connectors ('B' in Figure 5-32) located on the XWZB (X Wagon Z Board).
8. Remove the two cable connectors ('C' in Figure 5-32) attached to the Fan holder unit on the X wagon.

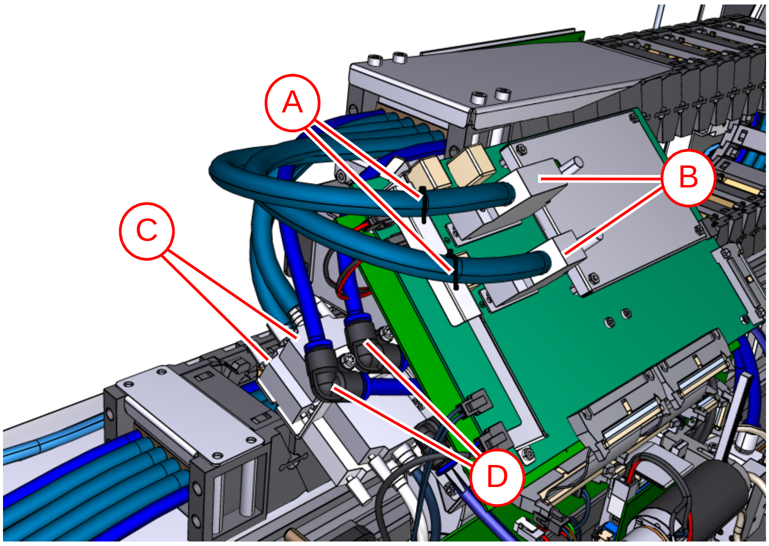


Figure 5-32. Remove X-wagon connectors.

9. On the X wagon, disconnect the vacuum and pressure hoses from the hose fittings ('D' in Figure 5-32).

10. Press the blue clamping ring on the hose fitting to remove the hose.

11. In the X wagon end of the cable chain, remove the long screws ('A' in Figure 5-33) that attach the cable chain to the bracket ('B') on the *Fan holder unit* on the X wagon.

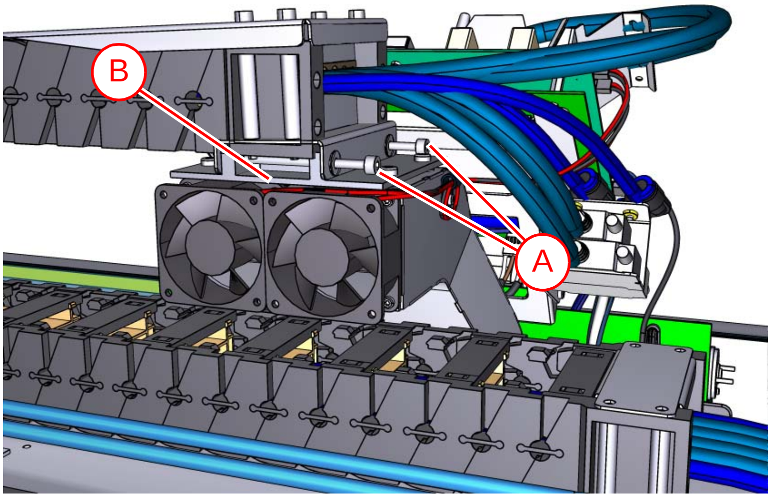


Figure 5-33. Remove cable chain from bracket.

12. Carefully remove the cable chain X wagon end from the bracket on the *Fan holder unit.*

13. Move the X wagon by hand as far as possible towards the opposite end position.

14. Now the cable chain assembly can be removed from the machine.

Mounting the cable chain

1. To make more space, move the X wagon by hand to the far end of the X beam.
2. Place the cable chain ('A' in Figure 5-34) on the X beam and align all cables between the two metal blocks with rubber recesses ('B').

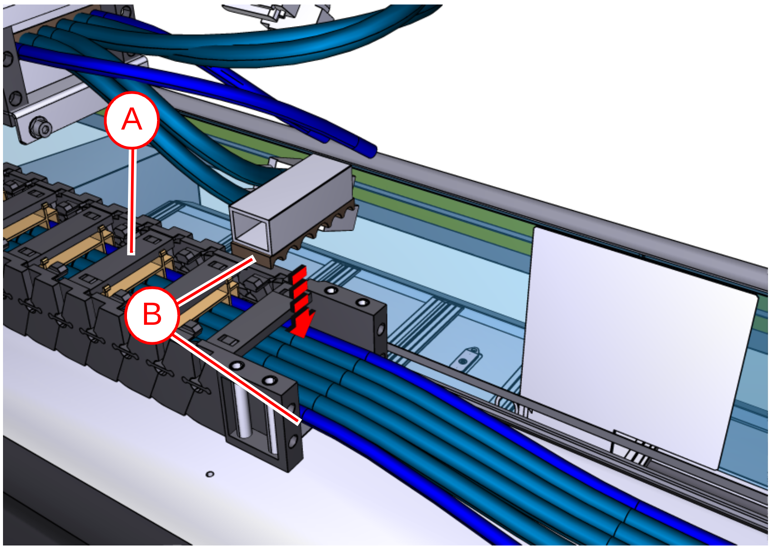


Figure 5-34. Align metal blocks.

3. Place the metal lid ('A' in Figure 5-35) on the cable chain and metal blocks and secure with four screws ('B').
4. Do not tighten the screws yet, the cables may need some adjustment before tightening the screws.

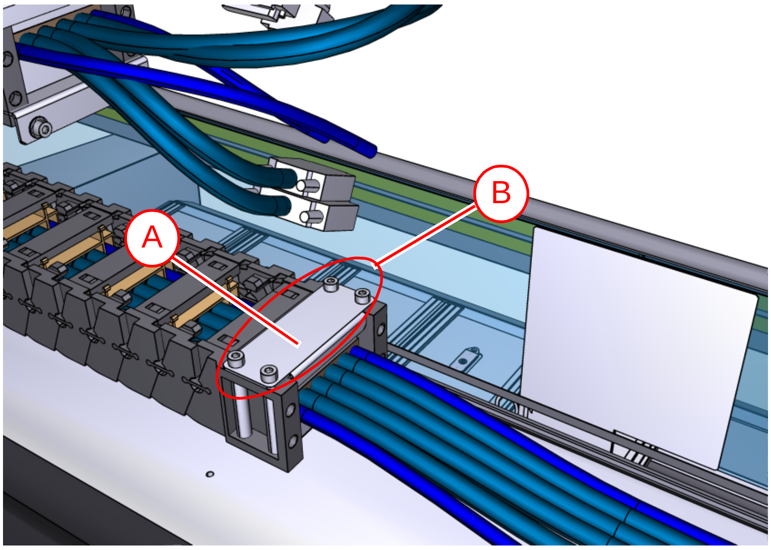


Figure 5-35. Attach cable chain to X beam.

5. Move the X wagon by hand to its end position.

6. Use two long screws ('A' in Figure 5-36) to attach the X wagon end of the cable chain to the bracket ('B') on the *Fan holder unit* on the X wagon.
   – Do not tighten the screws yet.

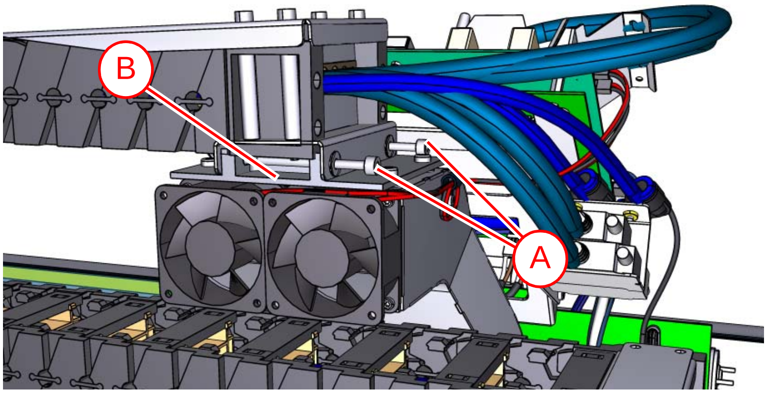


Figure 5-36. Attach cable chain to X wagon.

7. Ensure that the upper part of the cable chain (attached to the X wagon) is correctly aligned with the lower part of the cable chain (attached to X beam).
   – If neccesary adjust the cable chain bracket that is attached to the X wagon. This clamp can be slightly adjusted in Y direction.
8. When satisfied with the alignment, carefully tighten the long screws in the X-wagon bracket.
9. Attach and secure the two cable connectors ('A' in Figure 5-37) located on the XWZB (X Wagon Z Board).
10. Use cable ties to fixate the cables to the bracket ('B' in Figure 5-37) on the XWZB (X Wagon Z Board).
11. Attach and secure the two cable connectors ('C' in Figure 5-37) attached to the *Fan holder unit* on the X wagon.

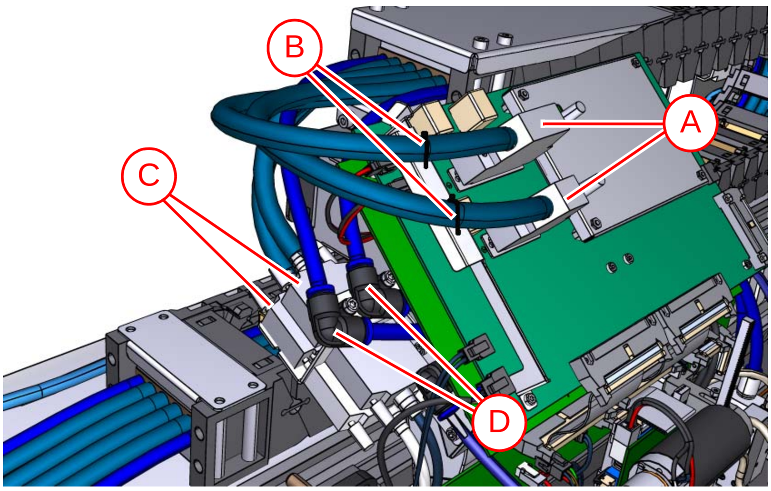


Figure 5-37. Attach X-wagon connectors.

12. On the X wagon, connect the vacuum and pressure hoses ('D' in Figure 5-37).
13. Verify that the end of each cable and hose projects approximately the same length from the end of the cable chain. If necessary, adjust each cable/hose as follows.
    - First push the cable/hose all the way in.
    - Then pull the cable/hose all the way out.
    - Then push the cable/hose back about half the way of the pulled out distance. See Figure 5-38.

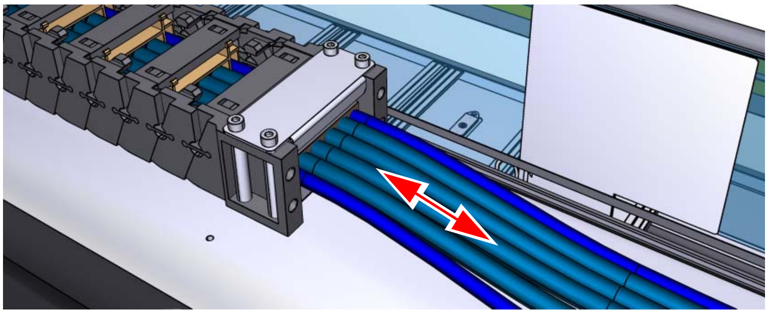


Figure 5-38. Adjust cables and hoses.

    - Ensure that the cables and hoses are evenly distributed inside the cable chain. With other words, there is an equal amount of space between each cable and hose inside the cable chain. See Figure 5-39

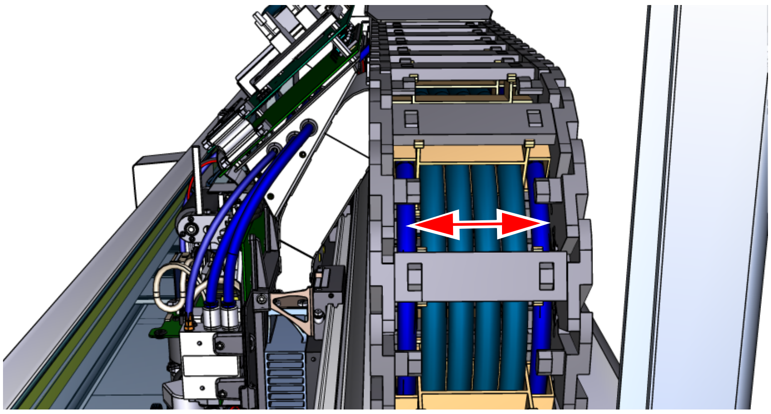


Figure 5-39. Adjust cables and hoses.

14. When satisfied with the alignment, tighten the four screws in the cable chain clamp. See Figure 5-35.
15. Attach and secure the four cable connectors to the left XFCB (X Frame Connector Board). See Figure 5-29. Refer to the markings on the cables to ensure that they are connected correctly.
16. On top of the X beam, connect the vacuum and pressure hoses in the hose fittings. See Figure 5-30. Refer to the markings on the hoses to ensure that they are connected correctly.
17. Place all cables and hoses in the cable clamp located on top of the X beam. When ready close the clamp.

6. Mount Heads

The MY100 series of machines are equipped with the following three types of mount heads. There are two different versions of the Midas mount head, Midas and Midas II (see Figure 6-1 and 6-2). There is also the HYDRA unit, which is a multiple mount head with eight mount tools (See Figure 6-3). Descriptions of these mount heads can be found in this Chapter.

– *Midas* on page 6-2 and *Midas II* on page 6-2. These are the fine pitch Midas mount head used on the MY100 machines.

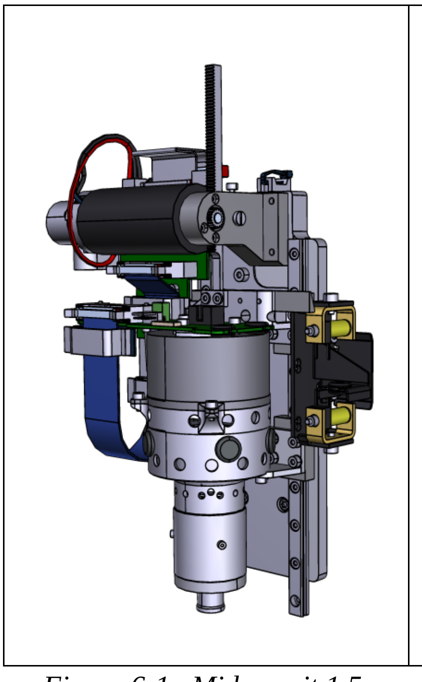


Figure 6-1. Midas unit 1.5.

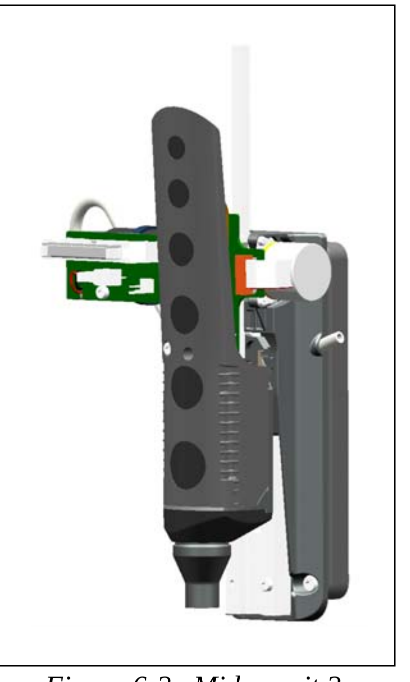


Figure 6-2. Midas unit 2

– *HYDRA Mount Head* on page 6-14. The HYDRA unit is a multiple mount head with eight mount tools (See Figure 6-3).

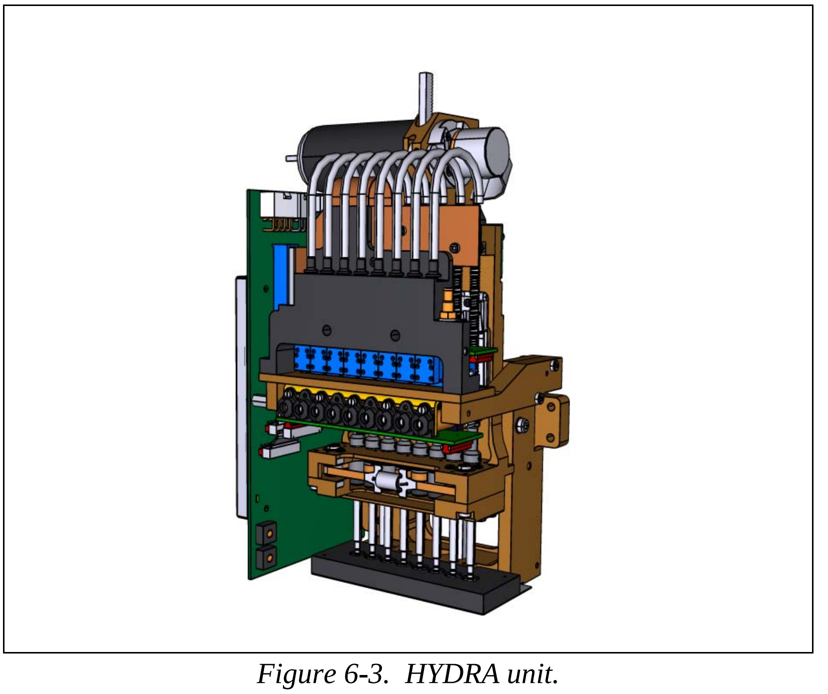


Figure 6-3. HYDRA unit.

Midas

The Midas is a highly accurate single mount head for the MY100 series of machines. Depending on machine model (MY100SX or MY100DX) the MY100 machine can be equipped with one or two Midas mount heads. The MY100 DX model is outfitted with two Midas mount heads, one on each X wagon. There is also a new Midas II mount head described on page 6-8.

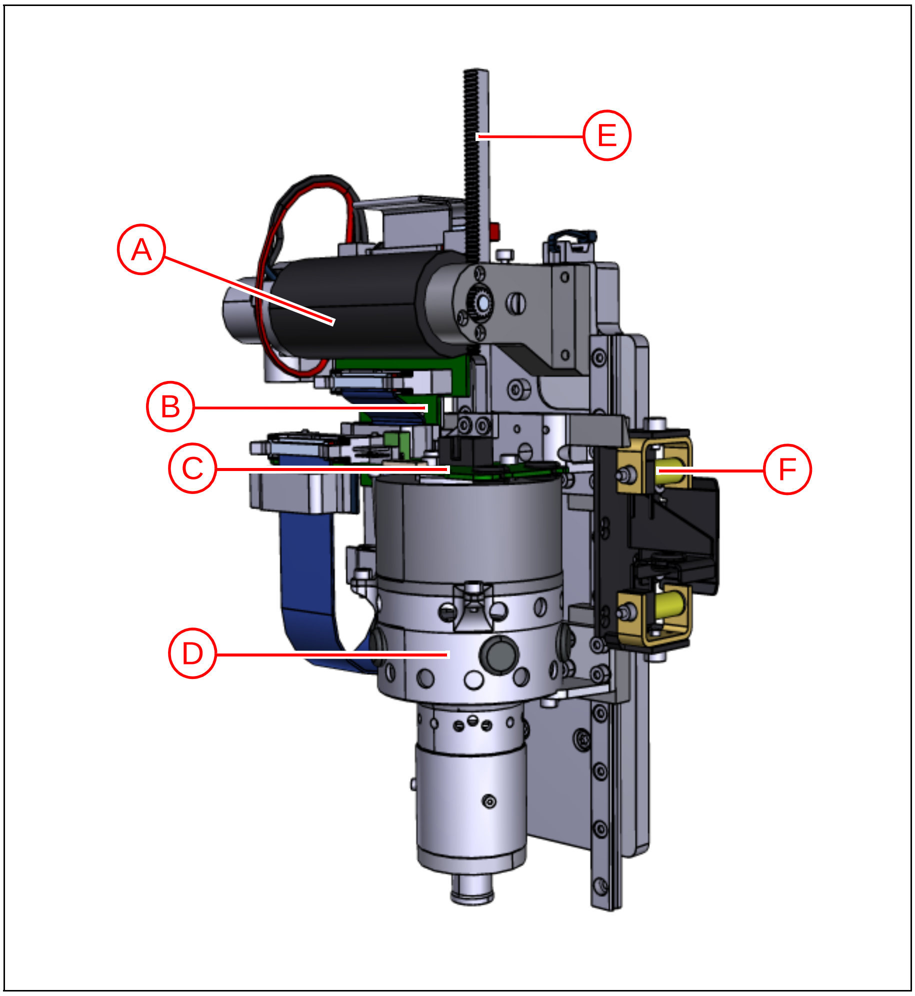


Figure 6-4. Midas unit.

System Parts

– Midas Z motor ('A' in Figure 6-4).

– MZB ('B').

– ZFIB2 ('C').

– Theta Unit ('D').

– Z unit ('E').

– Z locks ('F').

System Description

The Midas consists of two main units, the Z unit and the Theta unit (See Figure 6-4), which are assembled together. These two units include all devices needed for the Z movement and the Theta movement respectively.

When picking and placing components, Z can use either force/speed or a force sensor to detect a hit on a PCB. The force sensor is controlled by XWZB (X Wagon Z Board) and the FFX cable. To be able to use the force sensor it must use spring loaded tools.

In parameter group *23 Tool manager*, the physics of every tool can be found, such as, *installed*, *present* etc. In this group you can also indicate if a tool is spring loaded or not.

Theta movement

In Midas the Theta motor and encoder are integrated with the Z shaft guided by rigid play-free bearings.

Z movement

The Z motor with encoder is placed in the upper part of Midas, a rack and pinion drive connected to the Z unit controls the Z movement.

Midas is attached directly to the X-wagon plate with three screws.

Electrical System

Schematics

All schematics regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Electric Parts

ZFIB2 (Z Fi Board 2)

- The ZFIB2 (Z Fi Board 2) board is a connector board located on top of the Theta unit.

FFX (Force Sensor Flexible Board)

- FFX (Force Sensor Flexible Board is a flexible board with Z sensors. FFX is located in between the ZFIB board and the tool head to allow the Theta movement.

MZB (Midas Z Board)

- The MZB (Midas Z Board) is a connector board located between ZFIB2, Z Locks and Z motor with encoder.

CSEL (City Select)

For the computer to be able to communicate with each unit in the machine the unit must have its own address. The address for a particular unit is determined with a control called CSEL (City Select).

- The CSEL code for the right Midas should be set to '0'.
- The CSEL code for the left Midas (MY100 DX) should be set to '1'.

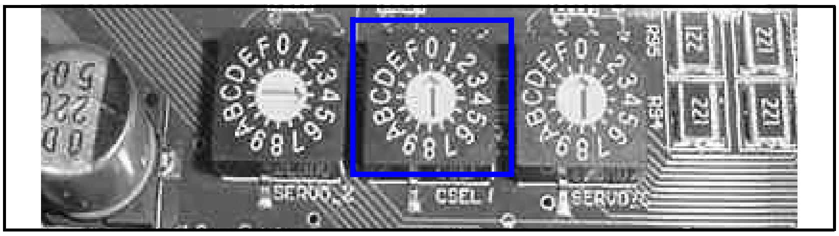


Figure 6-5. CSEL settings for right Midas.

Power Supply

The power and control signals to the Midas Theta motor is supplied directly from the XWZB (X Wagon Z Board), no other amplifier is used.

The *CanZC board* controls the theta and Z movement on the MIDAS-unit.

Functional Test

Several functional tests can be performed on the Midas mount head. For example measure vacuum pressure, check force sensor, measure friction for all different axes and motors. It also possible to view friction limits on all axes.

Refer to Chapter *Appendix A - Service Program Reference Guide* for information about all available commands.

Adjustments

This section comprises the following measurements and adjustments.

Measuring Midas Cog Play

This section describes how to measure the cog play for the Midas Z movement.

1. If you are in TPSys, select *Exit* > *Exit To Service* from the TPSys main menu.
2. Select *Head* > *Z* > *Test subsystems* > *Measure cog play*.

   Allow the test to perform.
3. The result can be viewed by selecting the *Show test logs* option. Select *Head* > *Z* > *Show test logs* to view the results on the screen.
4. If the cog play needs adjustment, please see the following section.

Adjusting the Midas Cog Play

This section describes how to adjust the cog play for the Midas Z movement.

☞ The Midas unit requires adjustment of the cog play if the Z motor has been replaced.

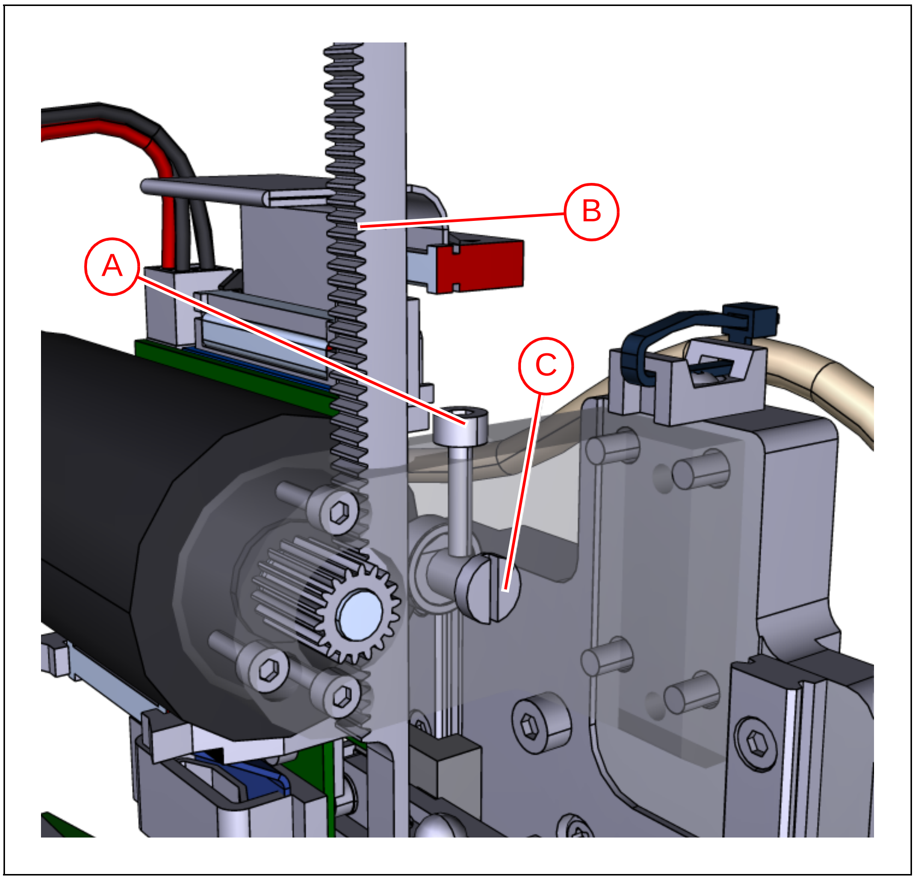


Figure 6-6. Adjusting the cog play.

1. Carefully loosen the locking screw ('A' in Figure 6-6).
2. Adjust the cog play. To check, press the rack ('B') gently towards and from the cog wheel by hand. Cog play must be as small as possible without increasing friction.

   Adjust the cog play by turning the excenter screw ('C').
3. Tighten the locking screw.
4. Measure the cog play again (see section *Measuring Midas Cog Play* on page 6-5). If the measured friction is too high, readjust the cog play and remeasure the friction again.

Troubleshooting

For information on how to troubleshoot the Midas unit refer to the Midas Troubleshooting Guide (P-010-0101-EN)

Repair Guidelines

The following *Repair Guides* are available for the Midas.

Repair Guide THETA MOTOR BRUSH................................ P-022-0042-EN
Repair Guide FFX P-029-0555-EN
Repair Guide Z MOTOR... P-022-0105-EN
Repair Guide Z LOCKS P-029-0191B-EN

All *Repair Guides* regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Use only authorized parts, to keep original level of machine safety. Any damage or malfunction caused by the use of unauthorized parts is not covered by warranty or product liability. Improper maintenance, deficient installation and not verified products can lead to serious defects and early loss off system performance. In case of an incident, the use of not original products and spare parts has wide-ranging legal effects including the expiration of the national and international type approvals.

Midas II

The new Midas II is a highly accurate single mount head for the MY100 series of machines. The new Midas II has been completely redesigned compared to the previous Midas models (see section *Midas* on page 6-2). Depending on machine model (MY100SX or MY100DX) the MY100 machine can be equipped with one or two Midas mount heads. The MY100 DX model is outfitted with two Midas mount heads, one on each X wagon.

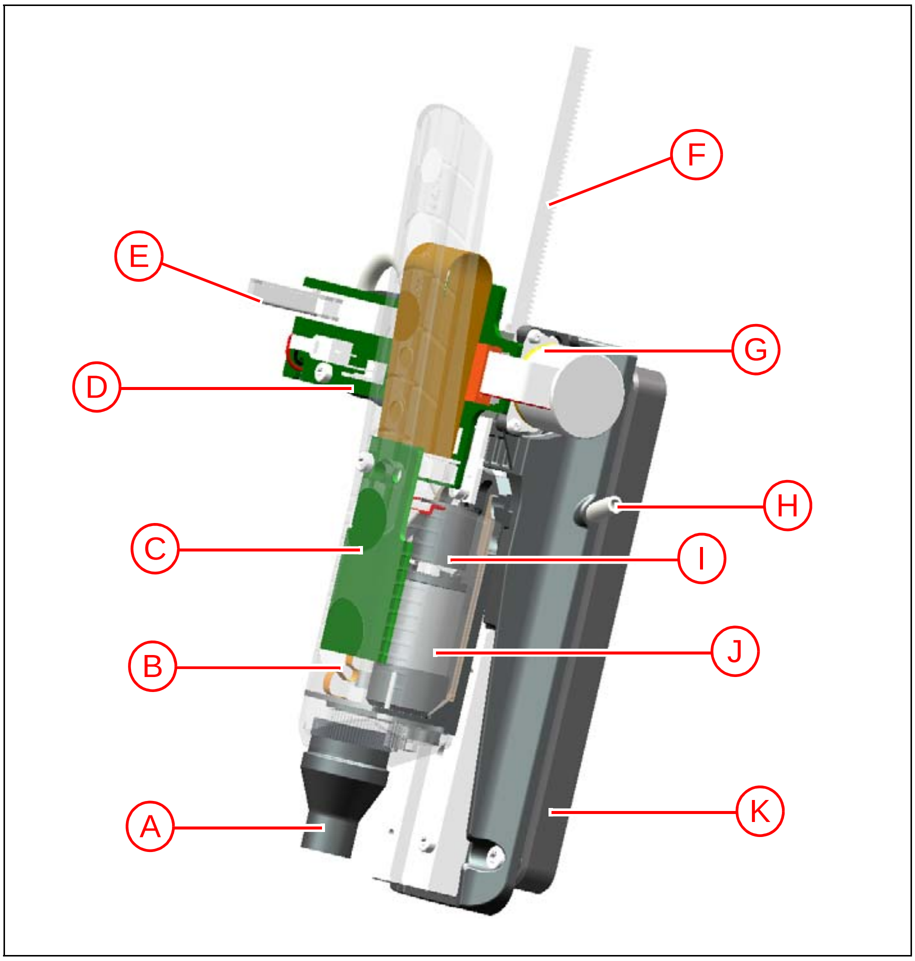


Figure 6-7. Midas II.

System Parts

- Tool holder with sealing ('A' in Figure 6-4).
- Z1FFX cable ('B').
- Z1FIB ('C').
- Z1ZB ('D').
- XMID connector ('E').
- Rack ('F').
- Z motor with encoder unit ('G').
- Vacuum tube ('H').
- Theta encoder ('I').
- Theta motor ('J').
- Z1 Adapter plate ('K').

System Description

Midas II consists of two main units, the Z unit and the Theta unit (See Figure 6-4), which are assembled together. These two units include all devices needed for the Z movement and the Theta movement respectively.

When picking and placing components, Z can use either force/speed or a force sensor to detect a hit on a PCB. The force sensor is controlled by XWZB (X Wagon Z Board) and the Z1FFX cable. To be able to use the force sensor it must use spring loaded tools.

In parameter group *23 Tool manager*, the physics of every tool can be found, such as, *installed*, *present* etc. In this group you can also indicate if a tool is spring loaded or not.

Theta movement

In Midas II the Theta motor and encoder are integrated with the Z shaft and the Z shaft is guided by rigid play-free bearings.

Z movement

The Z motor with encoder is placed in the upper part of Midas II, a rack and pinion drive connected to the Z unit controls the Z movement.

If the placement machine is equipped with the new mount head carrier plate (X wagon), then Midas II can be attached directly to the X wagon using three screws. Otherwise an adapter plate (see 'K' in Figure 6-4) is used to match the Midas II hole pattern with the hole pattern on the X wagon.

Electrical System

Schematics

All schematics regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Electric Parts

Z1FIB (Z1 Fi Board)

– The Z1FIB (Z Fi Board) is a connector board located on top of the Theta unit. The Z motor with encoder is attached to this board.

Z1FFX (Z1 Force Sensor Flexible Board)

– Z1FFX (Z1 Force Sensor Flexible Board is a thin flexible board with Z sensors. Z1FFX is located in between the Z1ZB board and the tool holder to allow the Theta movement.

Z1ZB (Z1 Z Board)

– The Z1ZB (Z1 Z Board) is a connector board which is connected to the Z1FIB.

CSEL (City Select)

For the computer to be able to communicate with each unit in the machine the unit must have its own address. The address for a particular unit is determined with a control called CSEL (City Select). The CSEL control for Midas II is located on the XWZB.

– The CSEL code for the right Midas II should be set to '0'.

– The CSEL code for the left Midas II (MY100 DX) should be set to '1'.

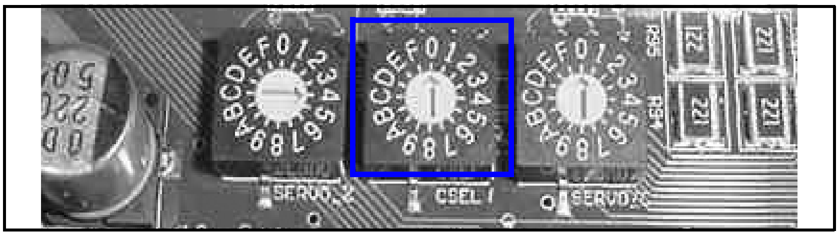


Figure 6-8. CSEL settings for right Midas II.

Power Supply

The power and control signals to the Midas II Theta motor is supplied directly from the XWZB (X Wagon Z Board), no other amplifier is used.

The *CanZC board* controls the theta and Z movement on the Midas II unit.

Functional Test

Several functional tests can be performed on the Midas II mount head. For example measure vacuum pressure, check force sensor, measure friction for all different axes and motors. It also possible to view friction limits on all axes.

Refer to Chapter *Appendix A - Service Program Reference Guide* for information about all available commands.

Adjustments

This section comprises the following adjustment description.

– *Adjusting Midas II Cog Play* on page 6-12.

Adjusting Midas II Cog Play

This section describes how to adjust the cog play for the Midas Z movement.

The Midas II unit requires adjustment of the cog play if the Z motor has been replaced.

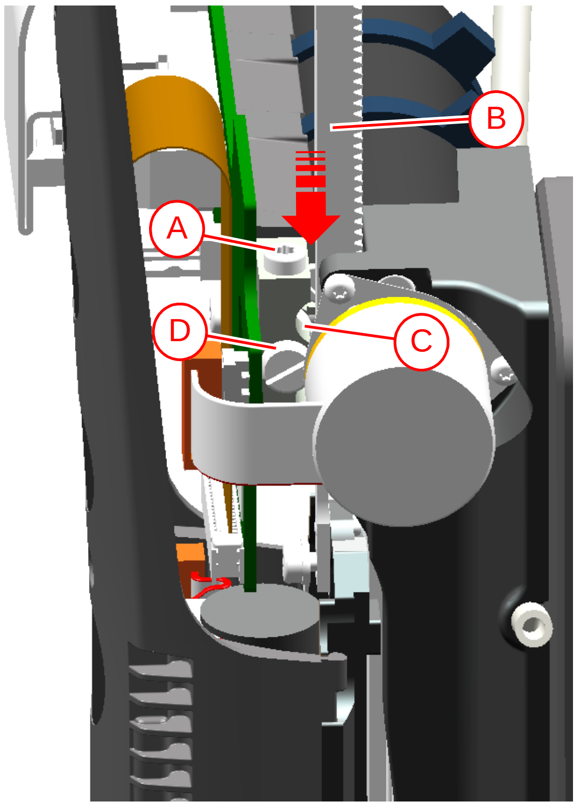


Figure 6-9. Midas II (right side view).

1. Exit TPSys and power off machine.
2. Manually move the Midas Z unit to the lower position.
3. Carefully loosen the locking screw ('A' in Figure 6-9).
4. At the arrow in Figure 6-9, insert a thickness gauge 0.05mm in the gap between the back of the rack ('B') and the pressure roller ('C').
5. Slowly turn the excenter screw ('D') until thickness gauge is fixed, then loosen adjustment until thickness gauge is movable but still not completely free.

   Make sure that there is no play for the thickness gauge when performing this adjustment.
6. When ready, tighten the locking screw ('A').

Troubleshooting

For information on how to troubleshoot the Midas II unit refer to the Midas II Troubleshooting (P-050-0091-EN).

Repair Guidelines

The following *Repair Guides* are available for Midas II.

Repair Guide Z motor.. P-022-0164-EN
Repair Guide Z encoder... P-022-0174-EN
Repair Guide Tool holder with sealing. P-022-0178-EN
Midas II installation guide.. P-050-0095-EN

All *Repair Guides* regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Use only authorized parts, to keep original level of machine safety. Any damage or malfunction caused by the use of unauthorized parts is not covered by warranty or product liability. Improper maintenance, deficient installation and not verified products can lead to serious defects and early loss off system performance. In case of an incident, the use of not original products and spare parts has wide-ranging legal effects including the expiration of the national and international type approvals.

HYDRA Mount Head

The HYDRA system is a multiple mount head designed to pick and place up to eight components during the same X movement. This considerably increases the placement speed.

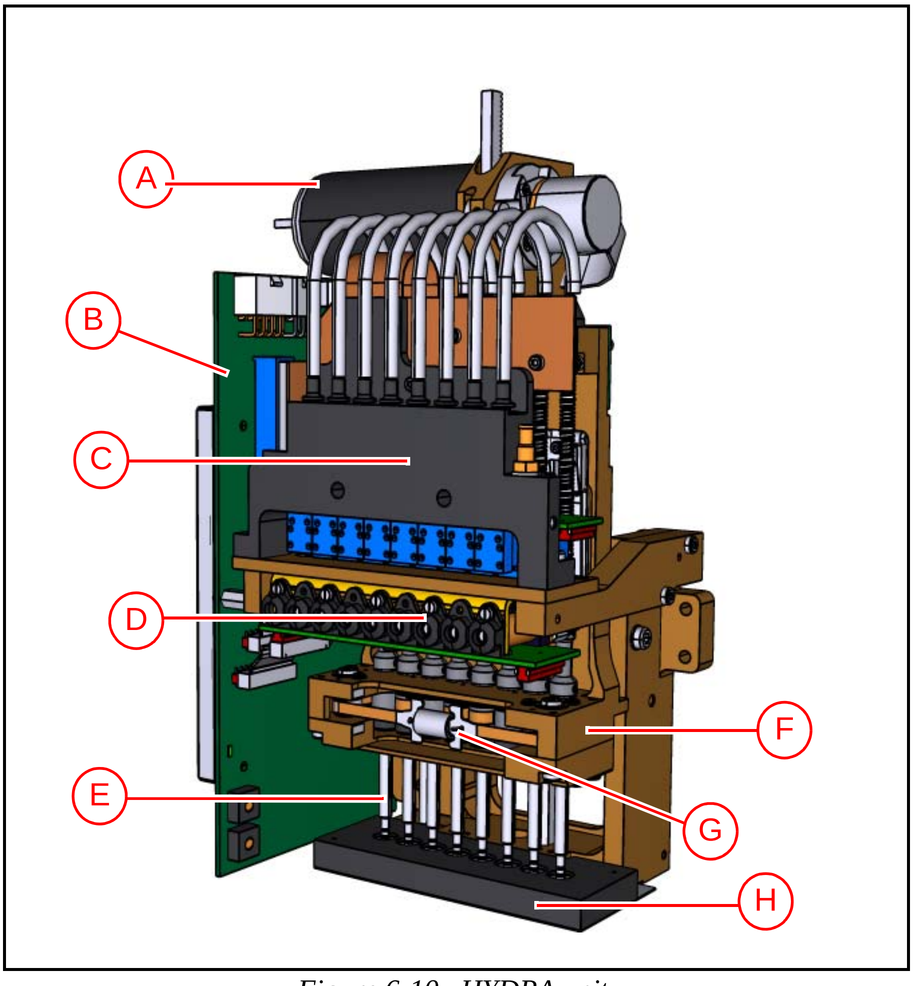


Figure 6-10. HYDRA unit.

System Parts

- HZ motor ('A' in Figure 6-10).
- HYDCB (HYDRA Computer Board 3B) ('B').
- Vacuum unit ('C').
- Solenoid unit ('D')
- HYDRA tool tube ('E').
- HZ wagon ('F').
- HYDRA theta unit ('G').
- Reference background ('H').

System Description

Depending on machine model (MY100SX or MY100DX) the MY100 machine can be equipped with one or two HYDRA mount heads. The MY100DX model is outfitted with two HYDRA mount heads, one on each X wagon. A lot of improvements have been made to the new HYDRA. The new HYDRA is now controlled by CAN.

The motor that controls the Z movement has been replaced with a motor that runs on 48V. The 48V motor is expected to last longer since the motor is automatically turned off.

The vacuum system has also been improved. The HYDRA now has sensors that measure the vacuum and air flow. The new HYDRA is also equipped with a function for measuring the tools eccentricities with the camera.

The tools used are dependent on the component size. The HYDRA can pick from all types of magazines.

The HYDRA is fastened on the X wagon with six screws. Three attachments ears, two on the left and one to the right side, provide the attachment points, on the two left ears there are also two guiding pins to ensure that the HYDRA will be attached in the correct position.

The HYDRA unit and Midas or Midas II unit are aligned by placing shims behind the HYDRA unit ears. The shims are held in place with magnets.

HYDRA Reference background

Depending on the installed vision system LVC (Linescan Camera) or HC2 (HYDRA Camera 2) the HYDRA can be outfitted with a large or small reference background.

The larger reference background (28 mm) enables the HYDRA to center components with the aid of the LVC (Linescan Vision Camera).

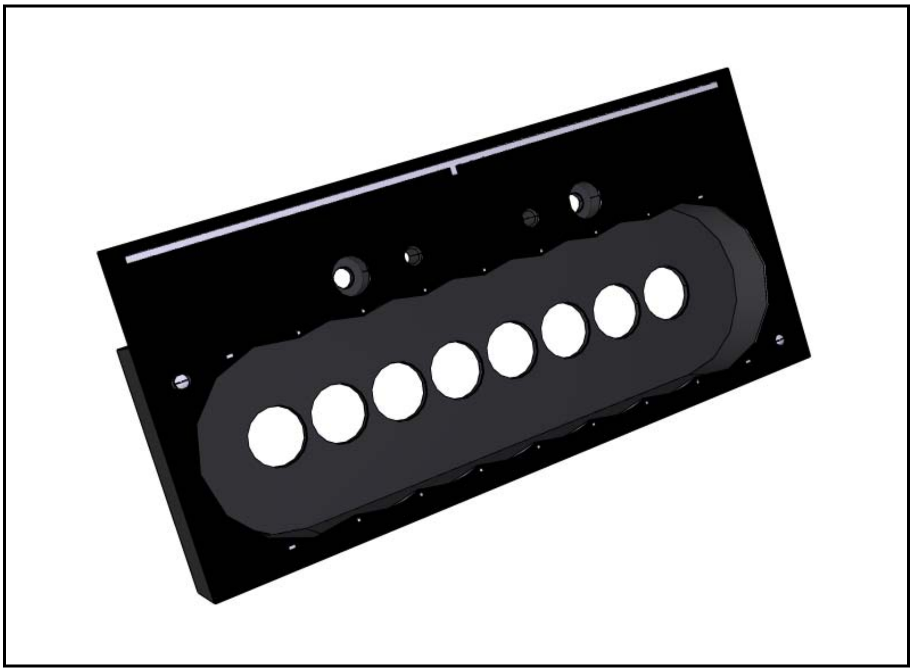


Figure 6-11. HYDRA Large reference background (28 mm).

The smaller reference background (14 mm) enables the HYDRA to center components with the aid of the HC2 (HYDRA Camera 2).

Figure 6-12. HYDRA Small reference background (14 mm).

Z movement

The control of the Z movement for the HYDRA is a motor with an encoder ('B' in Figure 6-13), driving a gear rack ('A'). It uses a CMOT, DSP based servos to control the movements.

The linear movement uses a three point mounting. Two ball bushings ('C') slide along the guide shaft. On the opposite side a flat guide plate ('D') moves between two ball bearings ('E'). The bearings are pressed against the guide plate to eliminate any play of the Z wagon.

The transmission between the motor and the moving parts consists of a rack and pinion. To control the play between rack and pinion an eccentric pin is used, similar to Midas.

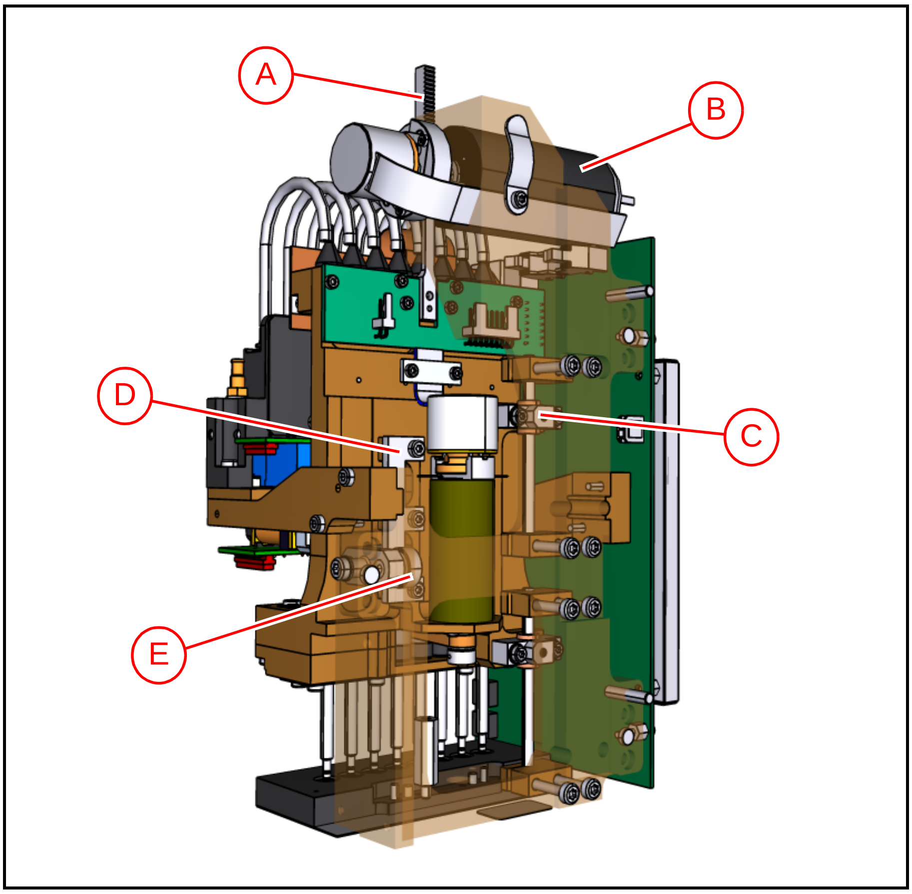


Figure 6-13. HYDRA rear view (transparent back frame).

Theta movement

The control of the HYDRA Theta movement is based on a motor ('A' in Figure 6-14) and an encoder. The resolution of the encoder is 40 units per degree.

The motor uses a belt, the Theta belt ('B'), to turn the tools ('C'). The pre-stress is 9-13N which is the optimal force in terms of friction and strength of the belt. To make the Theta belt stay in the right Z position the guide wheels and the motor pulley are cambered. They are also sandblasted to increase friction.

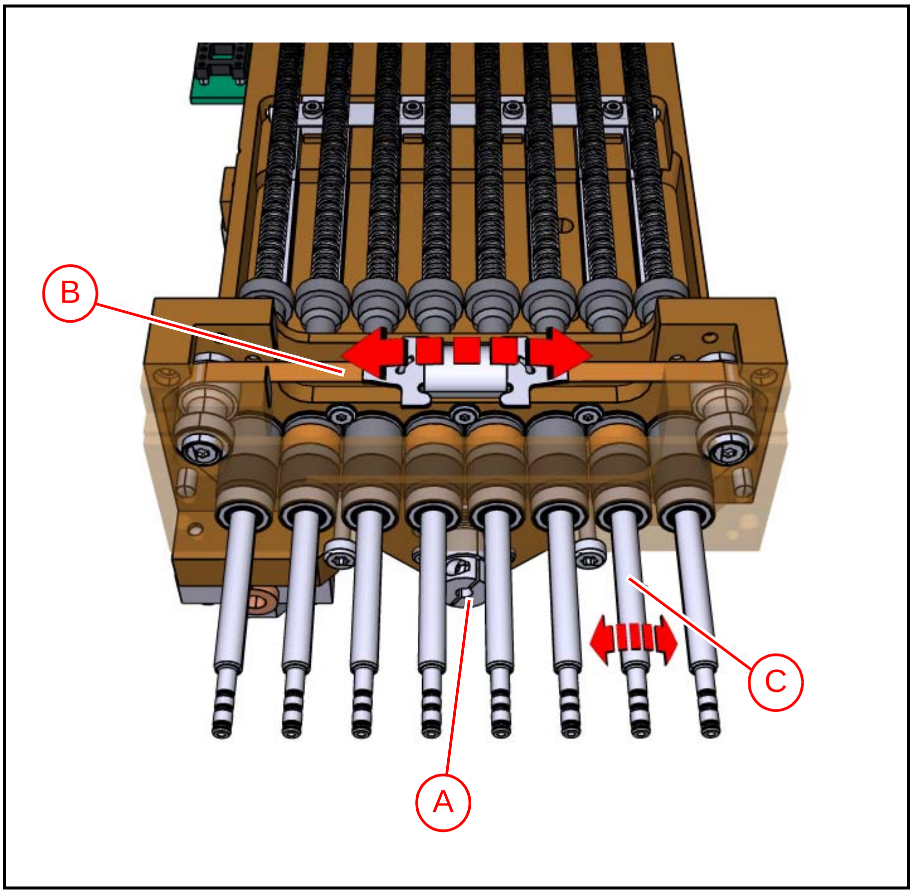


Figure 6-14. HYDRA *theta movement.*

The movement of the Theta belt is transferred to the tool via the tool adapter and the ball bushings. The Theta friction is kept low and constant by means of a swivel coupling for the tubing and a ball bearing for the lower end of the tool spring.

HYDRA Latches

The eight tools ('A' in Figure 6-15) can pick up to eight components simultaneously.

The tools are locked with a latch ('B'), the latch is connected to a solenoid ('C') and a latch finger ('D').

Each tool has eight springs ('E') providing the mount force, the springs have a force of 1.25 N. When the HZ wagon is moved downwards all tools will stay in the upper position. By activating a latch, the tool is free to follow the Z wagon down.

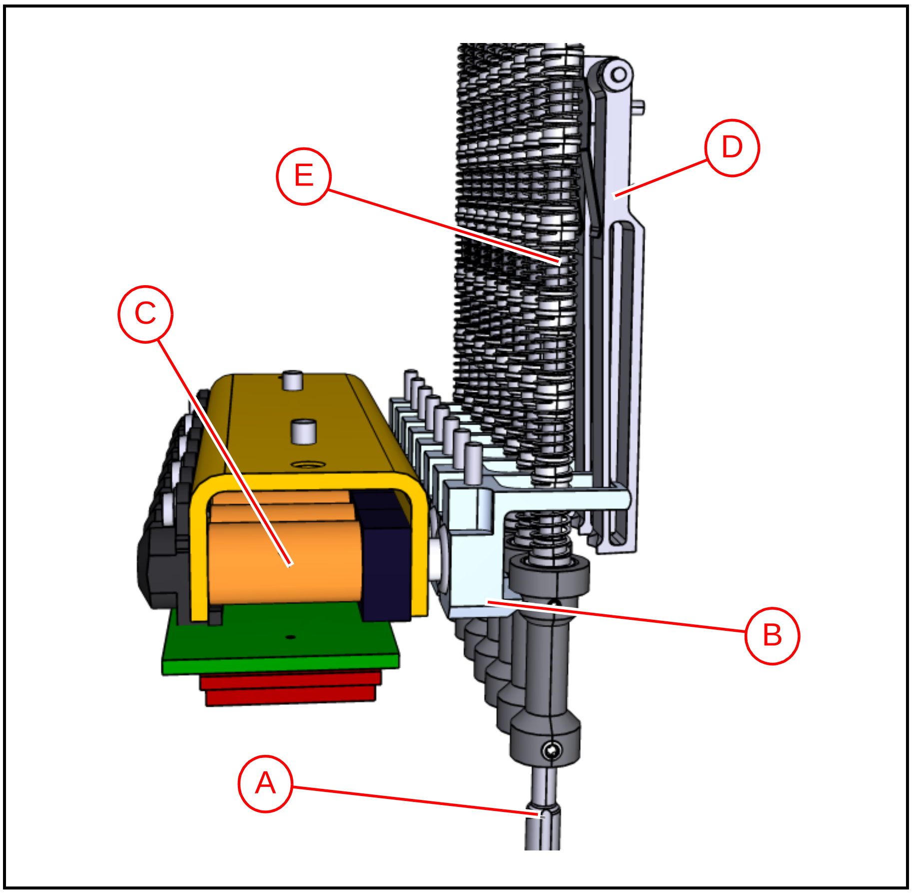


Figure 6-15. HYDRA latches.

The latch and the latch finger are also used when changing tools with HYDRA ATE (HYDRA Automatic Tool Exchange.), the latch fingers act as a mechanical stop, to push the tool tip onto the tool tube.

HZ Indicators

HZ is always above latches when Theta is moving to position. When picking and placing, the HYDRA uses the ISIC (Intelligent Surface Impact Control) function to indicate a hit (makes contact with a component).

There are eight individual impact sensors (HZ indicators), one for each tool. The sensors consist of a light source ('A' in Figure 6-16) and a light sensor ('B').

When a tool makes contact, the tool is pushed up and changes the amount of light reaching the sensor. The part that works as a curtain is the adjustable cylinder ('C') under the swivel coupling ('D').

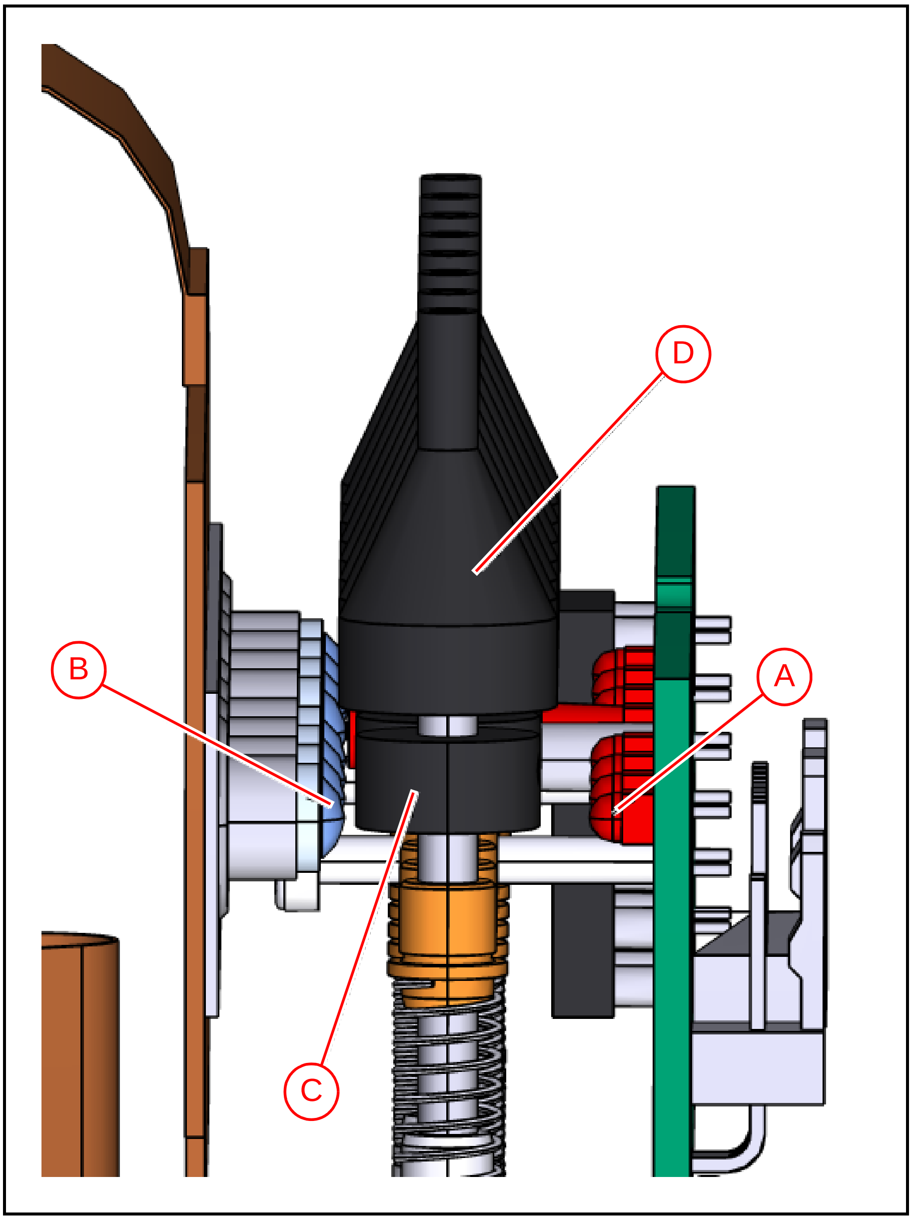


Figure 6-16. HZ indicators.

Electrical System

Schematics

All schematics regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Electric Parts

HYDCB (HYDRA Computer Board)

– The HYDCB (HYDRA Computer Board) controls everything on the HYDRA but the motors. It connects to the HYDVB3, HYDSB2 and the HYDUFB2. It also connects to the HZ motor and the HZ encoder. The relay and current output for the Z or the HZ motor are also controlled by this board.

HYDSB2 (HYDRA Solenoid Board 2)

– The HYDSB2 (HYDRA Solenoid Board 2) is a small board, 100mm by 25mm, which performs the connection of the nine solenoids on the HYDRA to the XHS connector on the HYDB board.

HYDVB3 (HYDRA Valve Board 3)

– The HYDVB3 (HYDRA Valve Board 3) performs the connection of the nine valves on the HYDRA to the HYDCB3B board.

HYDUFB2 (HYDRA Upper Front Board 2)

– The HYDUFB2 (HYDRA Upper Front Board 2) is a flex board with the HZ-sensors for the HYDRA.

HYUBB2 (Upper back board 2)

– The HYUBB2 (Upper back board 2) is a small board where the LED's for the ISIC, or HZ sensors are located. It also contains the connectors for the HFi motor and HFi-transducer. It connects to HYDUFB2.

CSEL (City Select)

For the computer to be able to communicate with each unit in the machine the unit must have its own address. The address for a particular unit is determined with a control called CSEL (City Select).

– The CSEL code on the HYDCB should be set to '0' for the Right HYDRA.

– The CSEL code on the HYDCB should be set to '1' for the Left HYDRA (MY100DX).

Functional Test

Several functional tests can be performed on the HYDRA mount head. For example measure vacuum pressure, measure friction for all different axes and motors. It also possible to view friction limits on all axes.

Refer to Chapter *Appendix A - Service Program Reference Guide* for information about all available commands.

Adjustments

This section comprises the following adjustments.

– *Adjusting the HYDRA Z indicators* on page 6-22.

– *Cog Play Adjustment* on page 6-24.

Adjusting the HYDRA Z indicators

Below the swivel ('1' in Figure 6-17) there is a cylinder acting as the z-indicator leveller. If the Z indicators need to be adjusted, the cylinder can be adjusted as follows.

1. Select *Exit* > *Exit To Service* from the TPSys main menu.

2. Select *Motor* > *HYDRA Z motor* > *Initiate motor*

Allow the initiation to complete. This initiation may fail due to badly adjusted sensors, but proceed with the next step anyway.

3. To see the vacuum and force values for the Midas and HYDRA mount heads, select *Motor* > *Show/Hide vacuum/force sensors*.

4. Release the HZ axis by selecting *Motor* > *HYDRA Z motor* or *HYDRA2 Z motor* > *Stand by*

5. Gently push the HZ wagon up and monitor that the system indicates *No* in the *Force/Hit* column.

6. For the HYDRA tool to be adjusted, verify that the force value in the *Force/Hit* column is between the shown *Min* and *Max* limits.

7. If necessary, adjust the indicator until the *Force* value are within limits. Follow the procedure below to adjust the indicator.
   - Loosen the M2 screw ('A' in Figure 6-17) on the cylinder ('B').
   - The indicators are adjusted by moving the cylinder ('B') up or down the vacuum tube ('C').

Moving the cylinder down increases the value.

   a. When satisfied, secure the cylinder with the M2 screw ('A').

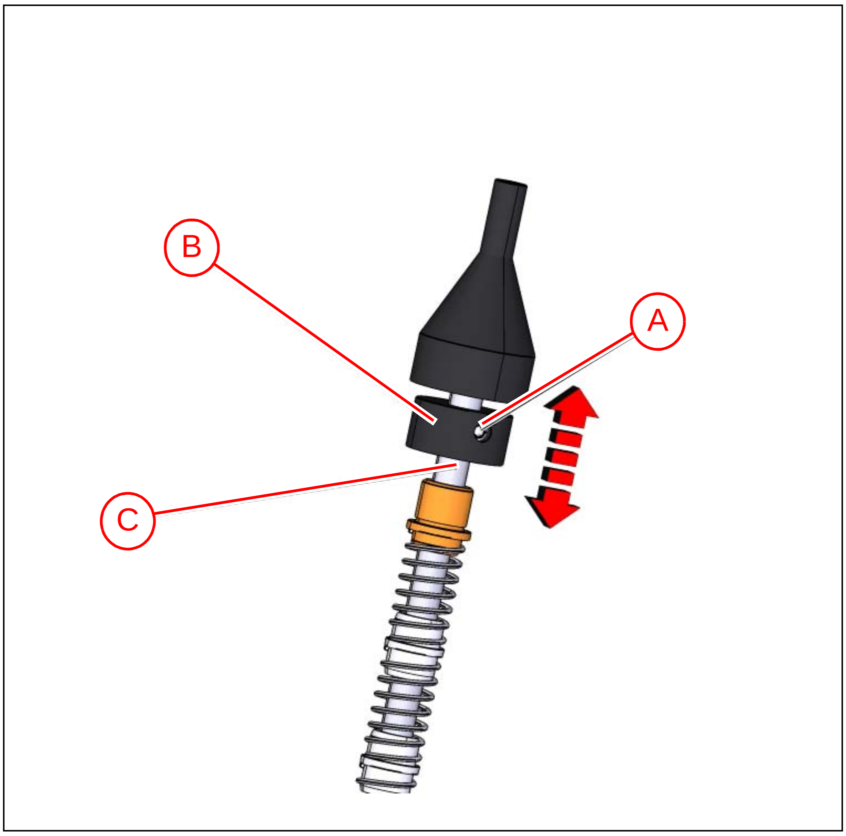


Figure 6-17. Adjusting Z indicator.

8. Repeat step 7 on all indicators until all values are within the limits.
9. Verify the adjustments by performing the *Initiate motor* procedure again (see step 2).

Cog Play Adjustment

1. Run the HYDRA *Service program*, *HZ Cog Play*. Follow the instructions given by the program.

   Depending on the result from the extended service program, reduce or increase the cog play as follows:

2. Loosen the locking screw ('A' in Figure 6-18).

3. Turn the eccentric adjustment screw ('B') slightly to reduce (too little cog play) or increase (too much cog play) the pressure of the bearing against the gear rack ('C').

   – From the mid position, the pressure is increased in both clockwise and counter-clockwise direction.

   – If it is difficult to reach the correct adjustment in both upper and lower position, chose a loose setting rather than adjusting the cog play too tight.

4. Tighten the locking screw.

5. Run the *HZ Cog play* test again and repeat the adjustment if necessary.

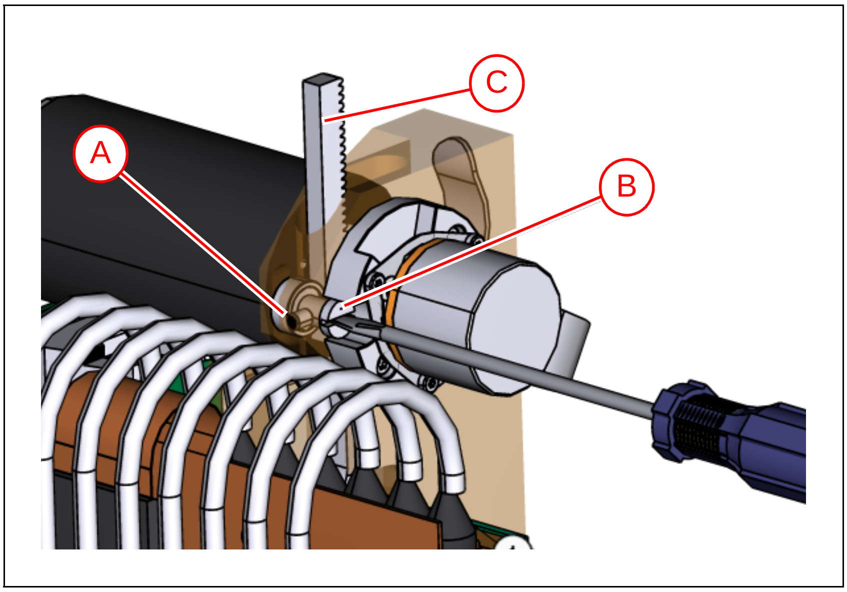


Figure 6-18. HZ Cog play adjustment.

Installation

This section describes how to attach the HYDRA mounthead to the X wagon and to align the Midas tool with all HYDRA tools. This instruction have been designed with the Midas tool head, but the procedure is the same for the Midas II mount head.

Requirements

- Dial indicator with magnetic base
- Allen key, 3mm
- Shims, thickness 0.6, 0.1 and 0.02 (Fastener kit HYDRA 2D/3 L-012-0614)
- Z tool A14 (stiff) (L-012-0013B) or A14 calibration tool (L-012-0422)

Procedure

1. If you are currently running TPSys, perform a system shutdown and wait until the system has halted.
2. Switch the mains power off.
3. Disconnect the following connectors from the XWCB-(L or R) board.
   - XMYCAN (HYDRA Unit).

     Also disconnect the vacuum tube from the HYDRA unit.
   - XMID (Midas Unit).
4. Switch the mains power on again and press the emergency stop button.
5. On the back of the HYDRA unit, put shims ('A' in Figure 6-19) with thickness 1.2 on the three attachment screws on the HYDRA frame. The shims thickness 1.2 is used as a starting point and may have to be modified during the installation procedure.

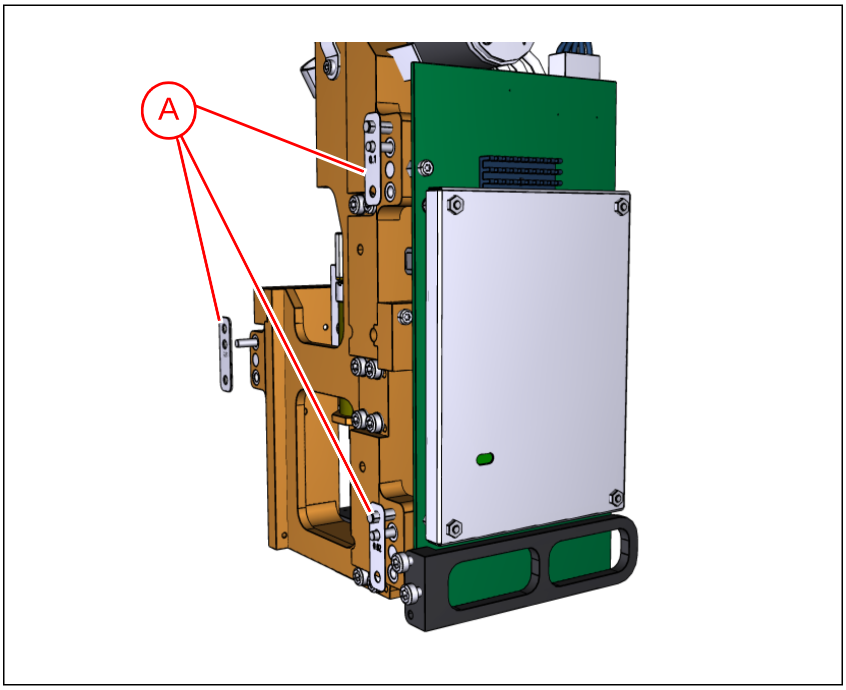


Figure 6-19. Put shims on attachment screws.

6. Attach the HYDRA preliminary according to Figure 6-20. When the screws and guide pins are correctly aligned, attach the HYDRA unit to the X-wagon plate with one screw per attachment ear (two screws on the left side and one screw on the right side).

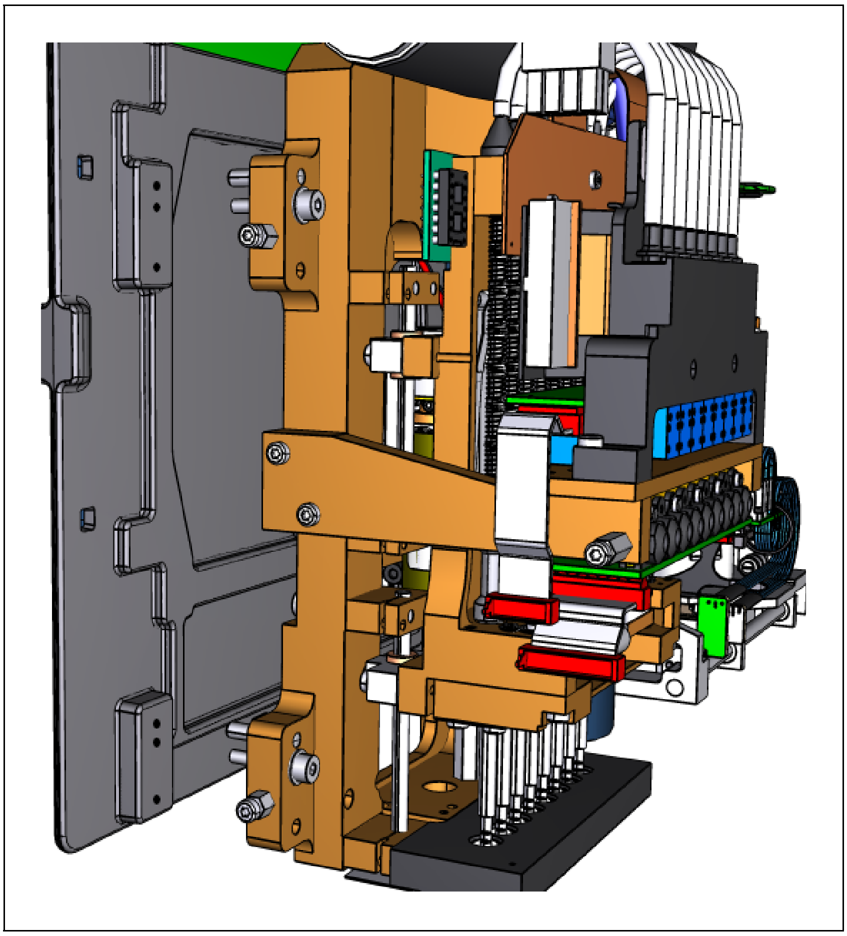


Figure 6-20. Attach HYDRA preliminary.

The HYDCB board has been excluded from the figure to improve visual clarity (It is not necessary to remove the HYDCB board).

---

7. Release the Hz-wagon leaving it to rest in the lower position. In order to make the Hz-wagon stay in the bottom position, release the tool tubes by carefully pulling each one of the eight latches out (See Figure 6-21 and 6-22).

Prevent the tooltubes from falling down uncontrolled by holding your hand under the tool tube when the latch is released. Otherwise the HYDRA unit may be damaged.

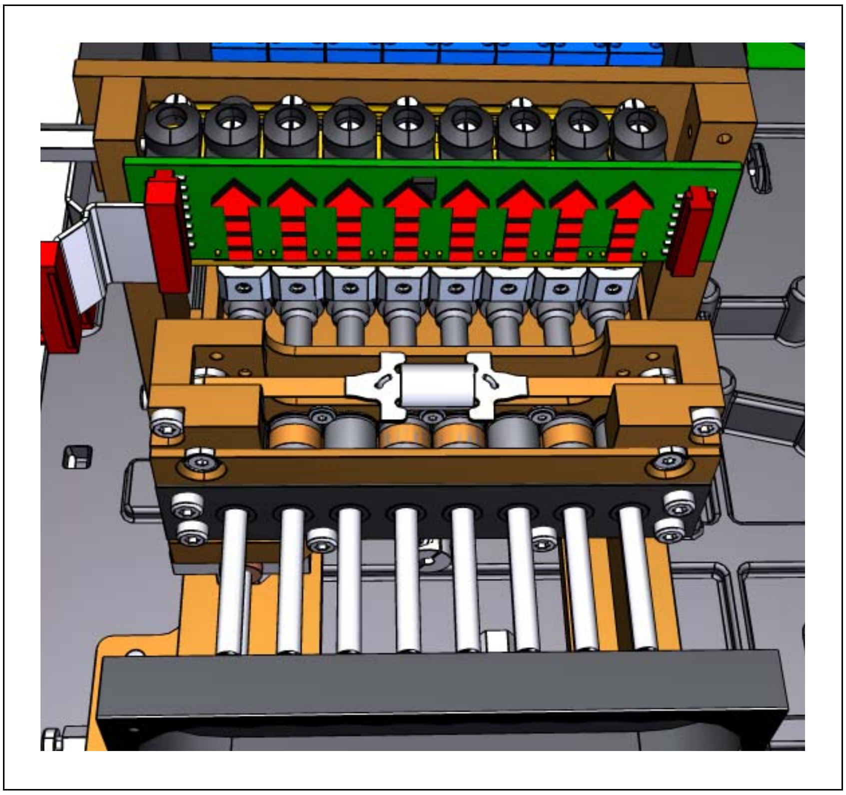


Figure 6-21. Release all tooltubes.

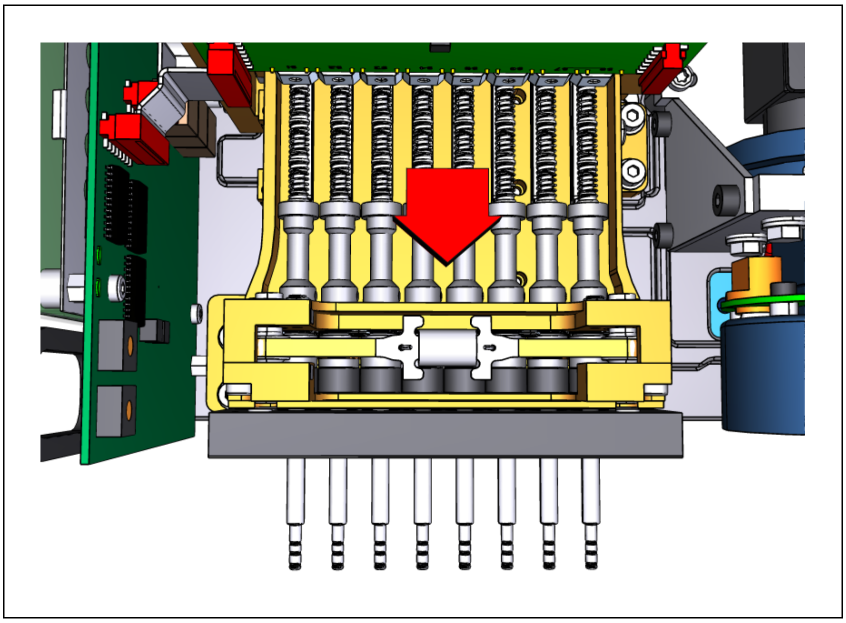


Figure 6-22. Tooltubes and Hz-wagon in lower position.

8. Position the dial indicator on the machine table. Secure the magnetic base of the indicator.

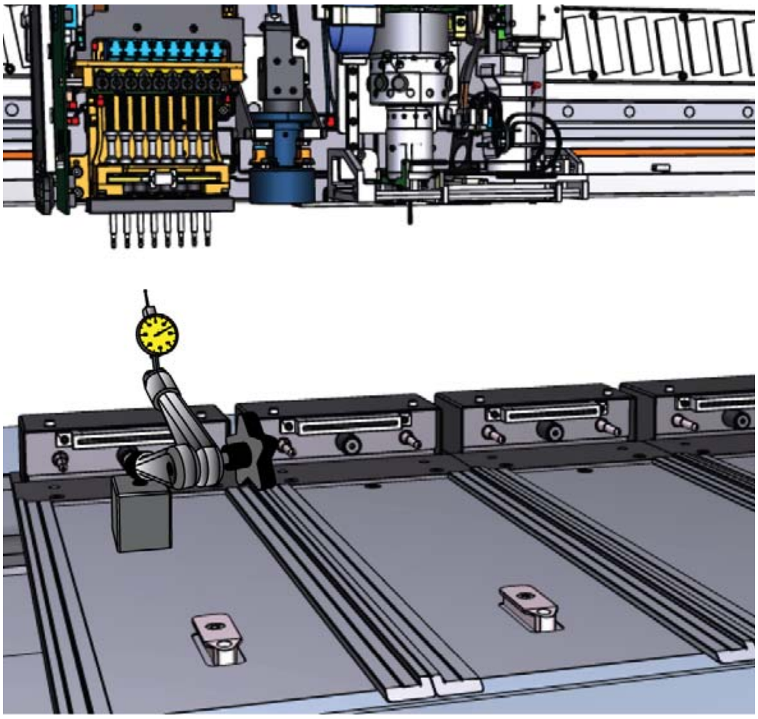


Figure 6-23. Place dial indicator on machine table.

9. Move the X wagon until the indicator is located approximately under HYDRA tool 1 (left most tool).
10. Position the dial indicator against HYDRA tool 1 and position the indicator probe between the tooltubes two top o-rings. See Figure 6-24.

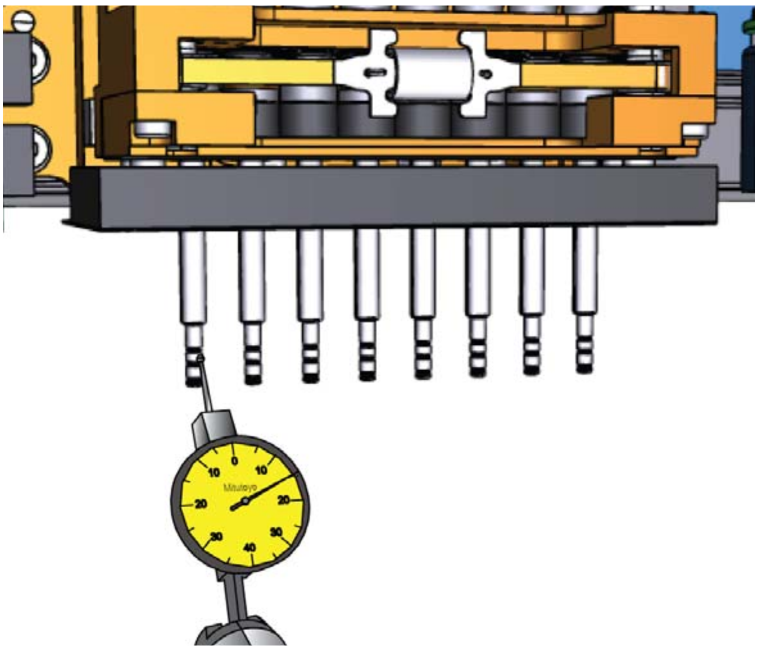


Figure 6-24. Position the dial indicator at HYDRA tool 1.

11. Lower the Midas Unit to the lowest possible position of the Z movement and leave it to rest on the lower Z lock.

– To fixate the Midas II unit in its correct position, a specifically designed spacer piece is needed. This spacer piece should be inserted between the stop screw and the stop lug on the Z unit sleigh as shown in Figure 6-25.

Note that some of the parts in Figure 6-25 have been rendered transparent to clarify the positioning of the spacer piece.

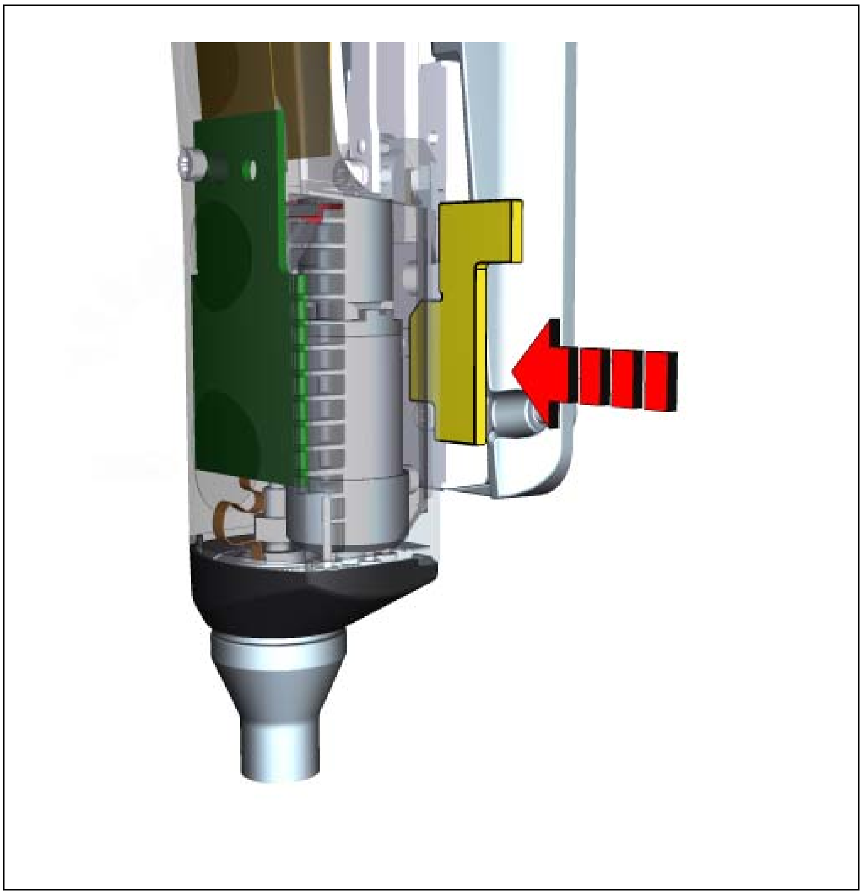


Figure 6-25. Insert spacer piece, Midas II.

12. Insert the 2.60mm Midas Z tool (A14 stiff or A14 calibration tool).

13. Move the X wagon until the indicator touches the Midas Z tool.

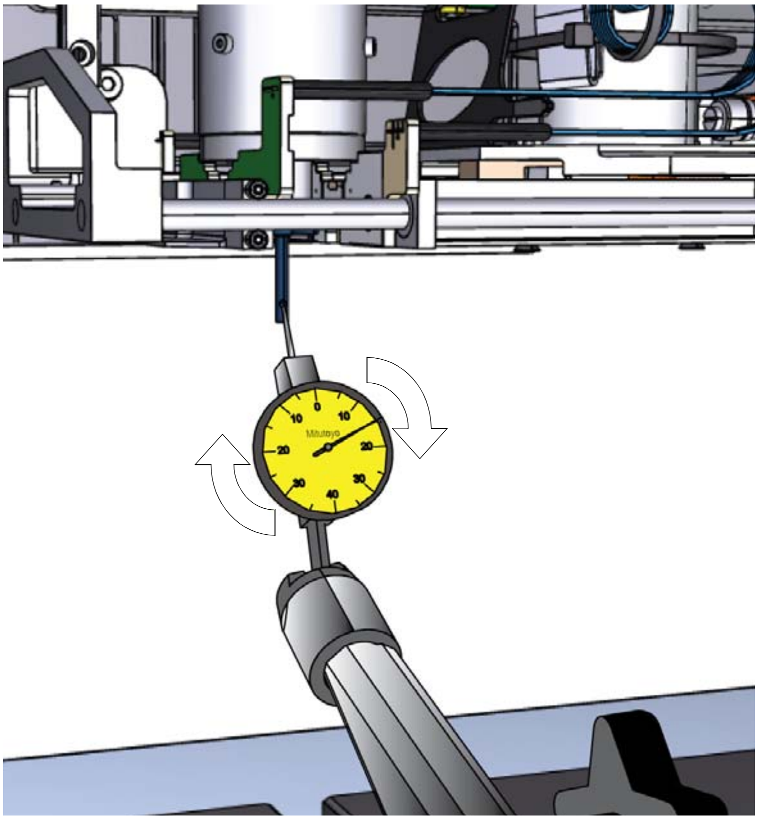


Figure 6-26. Position the dial indicator on Midas tool.

14. Center the indicator against the Midas Z tool.

15. Turn the Midas tool and set the indicator (by turning the gauge housing) to zero, at the middle of the tools eccentricity (wobbling) range. See Figure 6-26.

It might be necessary to slightly move the gauge to be within the range of measurement.

16. Move the X wagon back to HYDRA tool 1 and turn the tools (by moving the mylar tape back and forth, see top of Figure 6-27) until the indicator shows a value in the middle of the tools eccentricity range. Make a note of the received value.

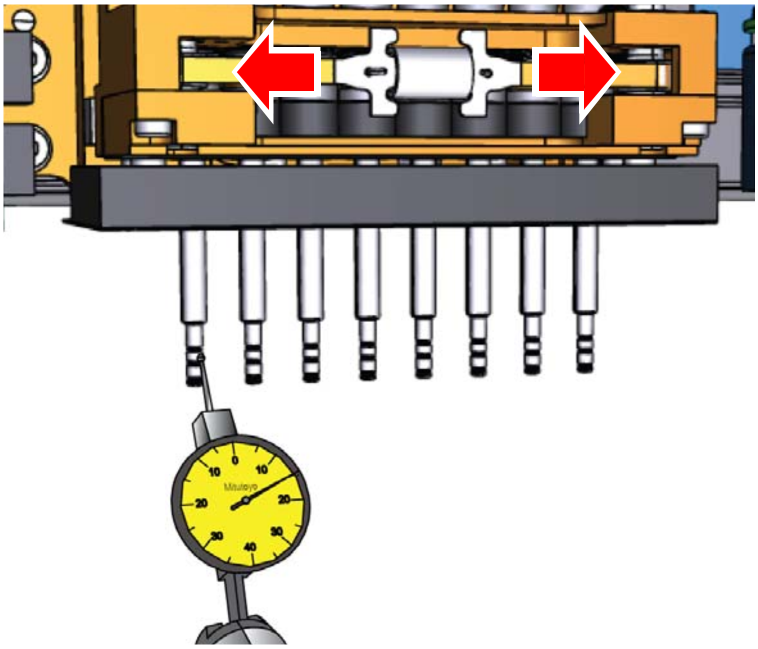


Figure 6-27. Position the dial indicator at HYDRA tool 1.

17. Move the X wagon to HYDRA tool 8 (right most tool) and repeat the procedure in the same way as for HYDRA tool 1.
18. The goal of this procedure is to align all HYDRA tools with the Midas A14 tool by putting adequate amount of shims between the HYDRA and the X wagon (See Figure 6-19). A different amount of shims may be required on the right and left side of the HYDRA, but normally not more than 0.2.

Maximum allowed difference in Y-direction between the Midas tool and the HYDRA tools is 0.02 mm.

---

19. After completed adjustment, attach the three remaining screws on the HYDRA unit (two screws on the left side and one screw on the right side.
20. Before removing the dial indicator, verify that the HYDRA unit has not moved when the last screws are tightened.
    – If the HYDRA has moved according to the indicator, go back to step 15 and redo the procedure.
21. When the adjustment is correct, remove the dial indicator.
22. Reconnect the XMYCAN and XMID to the XWCB-(L or R) board, also reconnect the HYDRA vacuum tube.
23. Switch the mains power on.

Troubleshooting

For information on how to troubleshoot the HYDRA unit refer to the HYDRA Troubleshooting Guide (P-010-0103-EN).

Repair Guidelines

All *Repair Guides* regarding HYDRA can be found in the HYDRA Troubleshooting Guide (P-010-0103-EN).

All *Repair Guides* regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Use only authorized parts, to keep original level of machine safety. Any damage or malfunction caused by the use of unauthorized parts is not covered by warranty or product liability. Improper maintenance, deficient installation and not verified products can lead to serious defects and early loss off system performance. In case of an incident, the use of not original products and spare parts has wide-ranging legal effects including the expiration of the national and international type approvals.

7. Tools & Tool Banks

This chapter contains a description of the different tools and tool banks used on MYDATA placement machines.

– *Midas Tools* on page 7-2.

  Description of the tools used on the Midas unit.

– *Midas Tool Bank* on page 7-5.

  Description of the Midas tool bank.

– *HYDRA Mount Tools* on page 7-9.

  The HYDRA mount tools used on the HYDRA unit.

– *HYDRA Tool Bank* on page 7-10.

  HYDRA Speedmount ATE, Automatic Tool Exchanger, is a system for changing HYDRA tools automatically

⚠

WARNING! In this chapter, some of the procedures cause the machine to make movements.The below warning must be followed for such procedures. Procedures that cause the machine to make movements are marked with this sign next to the text. Before entering such commands, check the following: Ensure that there are no foreign objects on the assembly table, near the tool bank, or within the X wagon, Y wagon, or Tray Wagon Magazine moving areas, and that the standard tool head and the HYDRA *tools are in their upper positions.*

Midas Tools

There are two types of mount tools available for the Midas unit:

– Stiff tools, see Figure 7-1.

– Spring-loaded tools, see Figure 7-2.

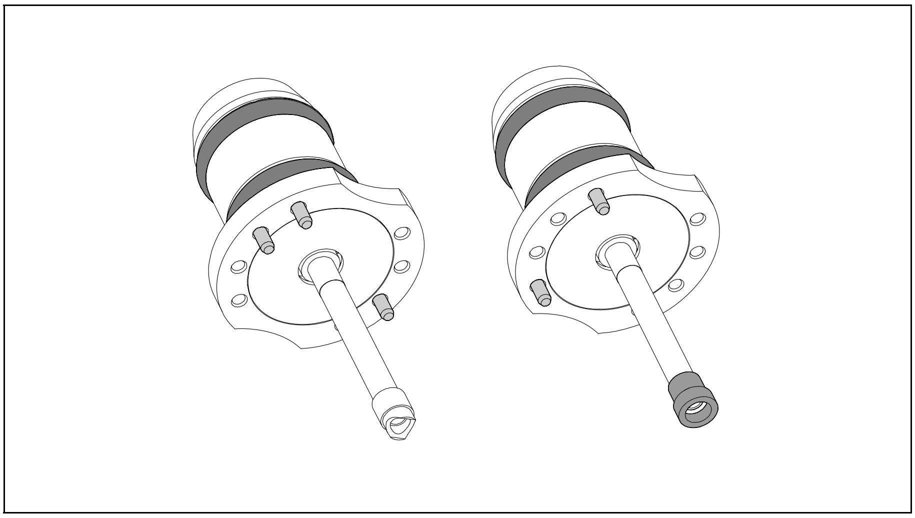


Figure 7-1. Stiff tools.

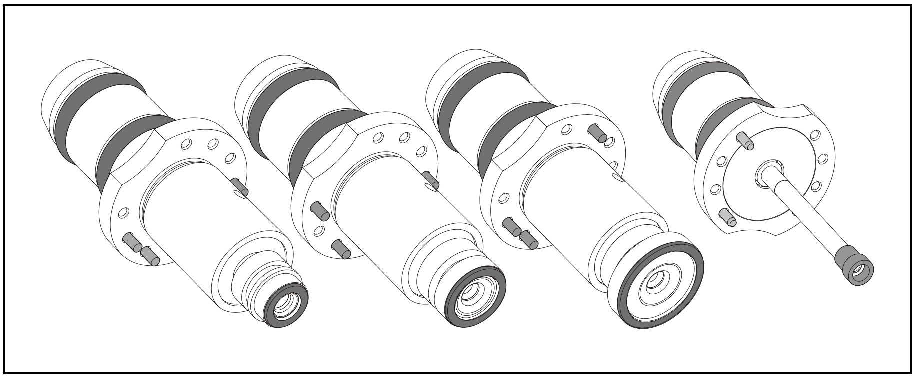


Figure 7-2. Spring-loaded tools.

The main difference between these two types of tools is that the spring-loaded tools provide a faster mounting speed by utilizing the Intelligent Surface Impact Control (ISIC) function. Both types are intended for the same component ranges. The A14S, A23S, A24S and C23S tools are spring-loaded versions of the A14, A23, A24 and C23 stiff tools. To get full Linescan Vision System performance, it is necessary to use spring-loaded tools.

Custom Tools

In some cases, custom tools may be bigger than 10 mm in diameter – the size of the biggest standard tools C23 and C23S.

The three following parameters in the *Edit tool* dialog box must be set if this is the case:

- *Lower edge of code pins*

  Measure with the biggest tool installed.

- *Tool case diameter*

  Measure with the biggest tool installed.

- *End of fast margin for C*

  Measure the dimension of the biggest part of the tool. Use the diameter on round tools, or the diagonal on other tools. Add 1 mm. If, for example, the tool has a diameter of 21 mm, set the parameter to 22 mm.

Follow the procedure below to set the parameters for a specific tool.

1. Start the calibration by selecting *Utility* > *Installation and Calibration* > *Tool Installation* > *Edit tool*

   The *Select tool to edit* dialog box is shown.

2. Press <Space> and select the tool to edit from the list.

   The *Edit tool* dialog box is shown (see Figure 7-3).

3. In the shown dialog box, set the parameters as desired.

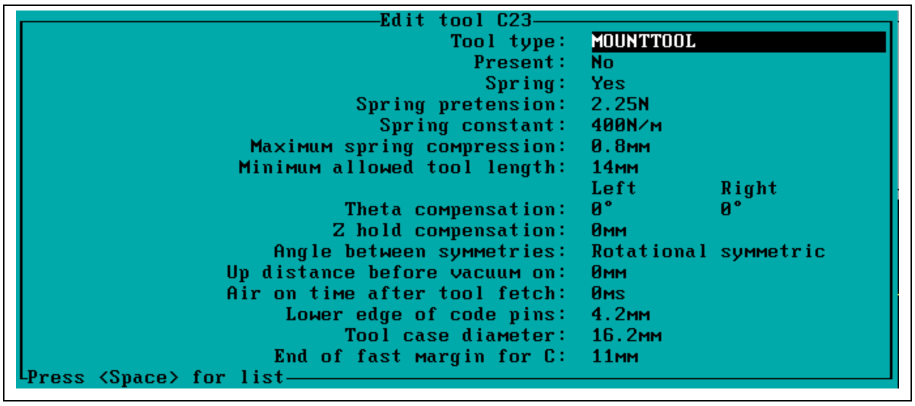


Figure 7-3. Edit tool dialog box.

Installation and Removal

This section describes how to install the Midas mount tools in the MY100 machine.

Installing Midas Tools

This procedure is used to install the Midas mount head tools, spring-loaded or stiff, before they can be used for placement or adhesive application.

WARNING! This procedure cause the machine to make movements. Ensure that there are no foreign objects on the assembly table, near the tool bank, or within the X wagon, Y wagon, or Tray Wagon Magazine moving areas, and that the standard tool head and the HYDRA *tools are in their upper positions.*

1. Select *Utility* > *Installation and Calibration* > *Tool Installation* > *Install tools.*
2. The *Select tools to install* dialog box is shown and a submenu with the following three options is opened.
   - *All tools*

     Including tools that have been previously installed.
   - *All uninstalled tools*

     Only the tools that are not installed.
   - *Specific tool*

     Only one specific tool. You have to choose which specific tool you want to install. Press <Space> to show a list of available tools.
3. When prompted, trim the tool positions by centering the crosshairs on the selected tools and confirm the positions with *Ready*.

This window is also used to edit installed tools.

CAUTION! The Spring parameter in the Edit tool dialog box must be set to No when a stiff tool is used otherwise there is a risk to get uncontrolled placement forces or impact forces which may damage the component and the board or the mount head. Always check that the parameters in the Edit tool dialog box are correctly set when a tool is exchanged.

CAUTION! Because of the wide tool body compared to the tool tip on A23S and A24S, there is a small but not negligible risk for collision between the tool body and tall components already placed, or between the tool body and the rails of the conveyors. This risk does not apply to the C23S tool. To limit this risk it is advisable to mount low components before mounting high components.

Midas Tool Bank

Depending on machine model, the MY100 machine is equipped with different toolbanks. The main difference between the toolbanks is that the MY100DX has two set of tools, one set for each X wagon.

The HYDRA tool bank are described in section *HYDRA Tool Bank* on page 7-10.

MY100DX Tool Bank

MY100DX is outfitted with a tool bank that is designed to carry a total of 33 Midas mount head tools, 12 of the tool positions are only used by the left X-wagon mount head and 12 are used by the right X-wagon mount head.The remaining 9 positions are common, and can be used by both X-wagon mount heads.

In the middle of the tool bank there is a bin for rejected components. The tool bank also has room for eight individual HYDRA tool banks, four on each side of the tool bank. This provides a total of 128 HYDRA tool positions.

An optional adapter plate can be attached to the tool bank which will provide space for special custom adapted tools. The tool bank can for example accommodate a big-size-tool adapter, normally used for larger custom tools.

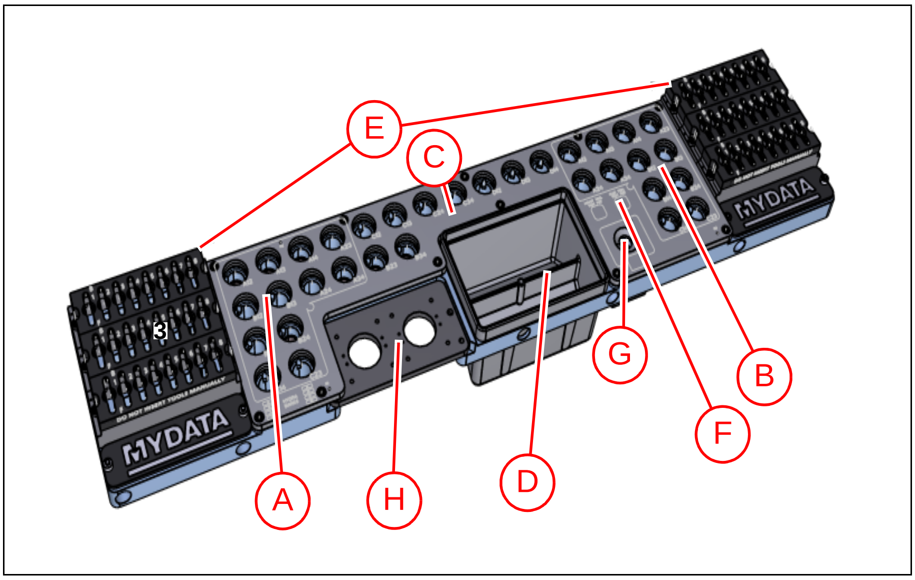


Figure 7-4. MY100DX Tool bank.

- Left X-wagon mount tools ('A' in Figure 7-4).
- Right X-wagon mount tools ('B').
- Common tools ('C').
- Reject bin ('D').
- HYDRA tool banks ('E').
- Tool and glue tool check positions ('F').
- Conveyor release button ('G').
- Optional adapter plate for custom tools ('H').

MY100DX tool bank layout

The MY100DX tool bank has the following tool numbering (see figure 7-5). The tool positions 'X1' and 'Y1' are tool positions on the optional adapter plate.

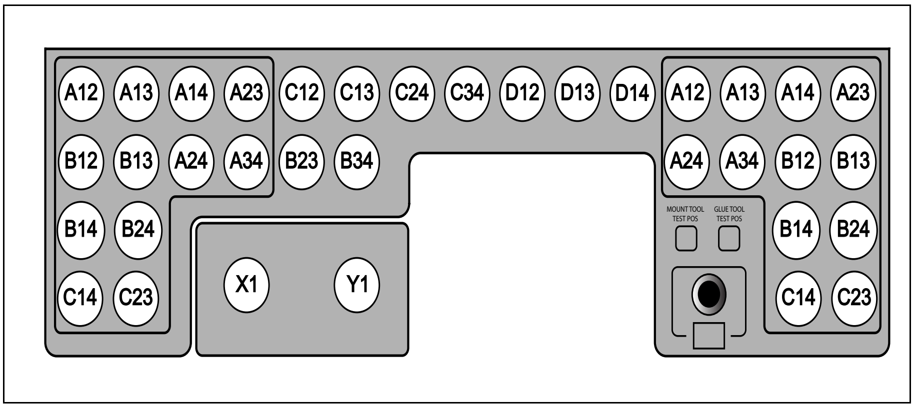


Figure 7-5. MY100DX tool bank layout.

MY100SX Tool Bank

MY100SX is outfitted with a tool bank that is designed to carry a total of 24 Midas mount head tools.

In the middle of the tool bank there is a bin for rejected components.

On the left side of the tool bank there are room for four individual HYDRA tool banks. This provides a total of 32 HYDRA tool positions.

An optional adapter plate can be attached to the tool bank which will provide space for special custom adapted tools. The tool bank can for example accommodate a big-size-tool adapter, normally used for larger custom tools.

The conveyor release button is located to the lower right corner of the toolbank. The tool and glue tool check positions are located to the left of the optional adapter plate (see Figure 7-6).

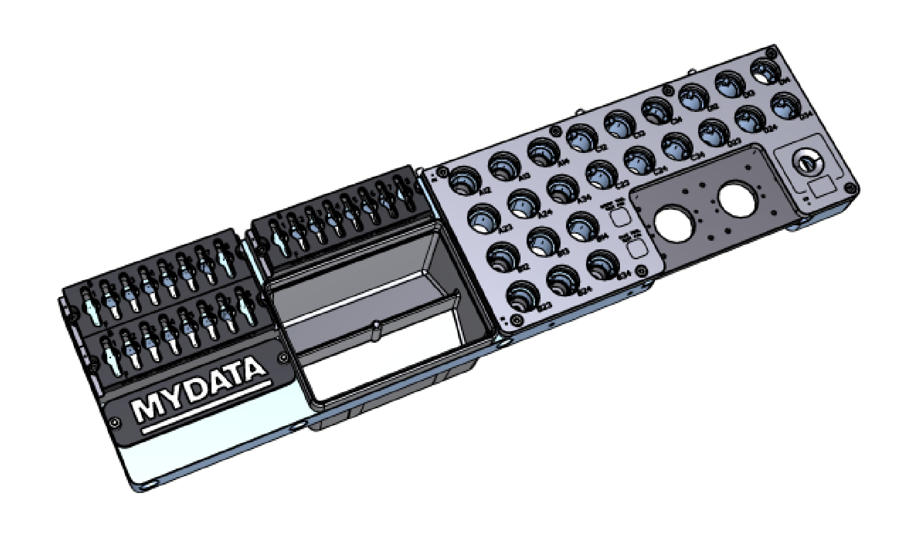


Figure 7-6. MY100SX Tool bank.

MY100SX tool bank layout

The MY100SX tool bank has the following tool numbering (see figure 7-7). The tool positions 'X1' and 'Y1' are tool positions on the optional adapter plate.

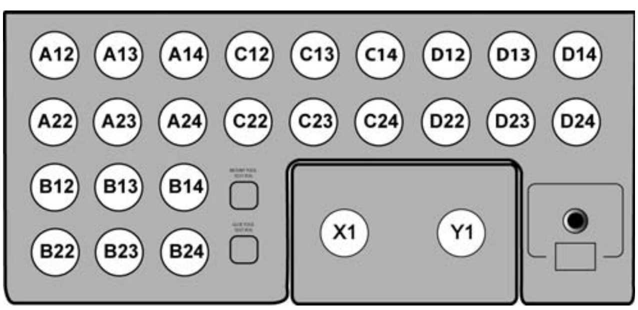


Figure 7-7. MY100SX tool bank layout.

Installation and Removal

This section describes how to install and remove a Midas tool bank in the MY100 machine.

Installing the Midas Tool Bank

1. Select *Utility* > *Installation and Calibration* > *Tool Installation* > *Install tool bank* in TPSys. The *Select tool bank type* dialog box is shown.
2. Press <Space> to show a list of available tool banks.
3. Select which tool bank to install from the list of tool banks.
4. Press <Enter> to install the selected tool bank.

An A23S tool has the same code pin configuration as the corresponding stiff tool A23. The same applies for A24S and C23S. It is therefore not possible to use a spring-loaded tool and the corresponding stiff tool simultaneously.

Removing the Midas Tool Bank

1. Select *Utility* > *Installation and Calibration* > *Tool Installation* > *Remove tool bank.*

   The *Remove tool bank* dialog box is shown.
2. Select which tool bank to remove from the list of installed tool banks.
3. Press <Enter> to remove the selected tool bank.

HYDRA Mount Tools

The HYDRA mount tools consist of a tube with a changeable nozzle (H01 – H06), see Figure 7-8.

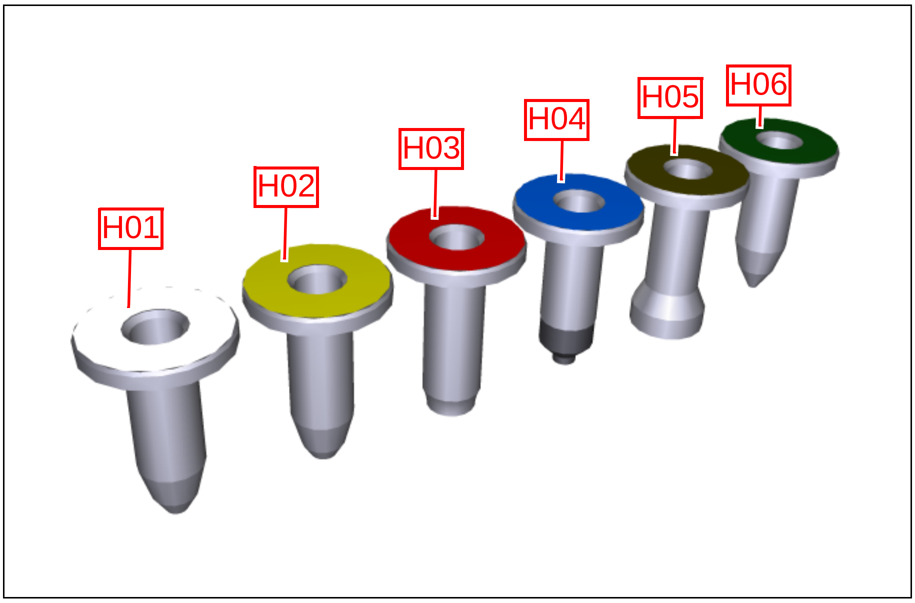


Figure 7-8. HYDRA mount tools.

There are, for the time being, six types of HYDRA tools intended for different sizes of component packages. Each tool type has its own identification color on the top of the nozzle. Mount tools must be kept free from dirt and foreign particles to prevent the tubes from being clogged up.

HYDRA Tool Tubes

The HYDRA tool tubes ('A' in Figure 7-9) are attached to the HYDRA unit. The HYDRA unit moves to the HYDRA tool bank where the tool tubes leave the current tools before picking up new ones.

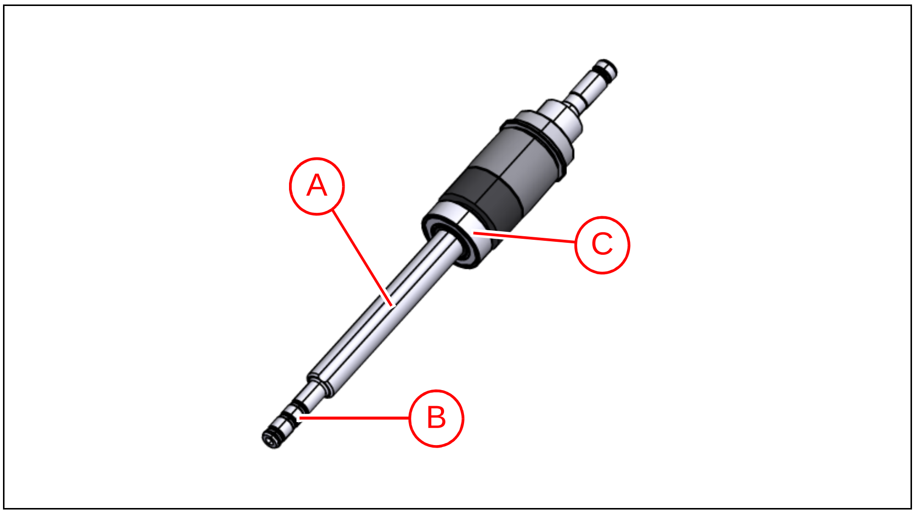


Figure 7-9. HYDRA tool tube.

Each tool is held in place on the tool tube by three O-rings ('B'). This ensures that the tool is always properly aligned and can be replaced without re-calibrating the HYDRA unit.

HYDRA Tool Bank

HYDRA Speedmount ATE, Automatic Tool Exchanger, is a system for changing HYDRA tools automatically.

Instructions regarding how to operate the ATE system can be found in the *Operators Manual*.

In the following text, the HYDRA ATE tool bank is called HYDRA tool bank or just tool bank.

System Description

The HYDRA tools are stored in the HYDRA tool bank when not in use. When the tools are to be exchanged, the HYDRA unit moves to the bank and the tools are exchanged.

Each tool resides in an own position in the tool bank. When a tool is automatically fetched by the HYDRA unit, it is considered that the HYDRA unit has borrowed the tool from the tool bank. So, all the tools reside in their own tool bank positions but are temporarily attached to the tool tubes on the HYDRA unit.

If a tool is damaged it is regarded as a manual tool in TPSys and not a tool from a tool bank.

The first tool tube (position 1 in the HYDRA unit) fetches a tool from one of the two tool slots with index No. 1 in the tool bank ('A' in Figure 7-10). The second tool tube ('B') fetches from one of the slots marked 2, and so on.

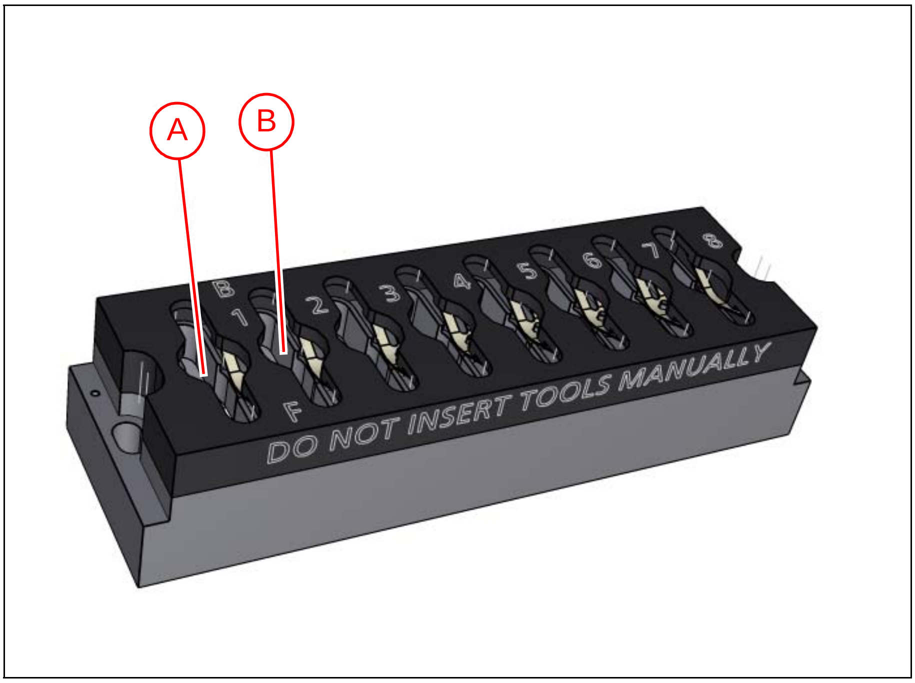


Figure 7-10. HYDRA tool bank.

Tool Bank Parts

A HYDRA tool bank consists of the following parts, see Figure 7-11.

- A lid ('A') with recessions underneath to ensure the positioning of each tool.
- A spring ('B') that presses the tools against the lid.
- A housing ('C').
- Four mounting screws ('D') for the lid.

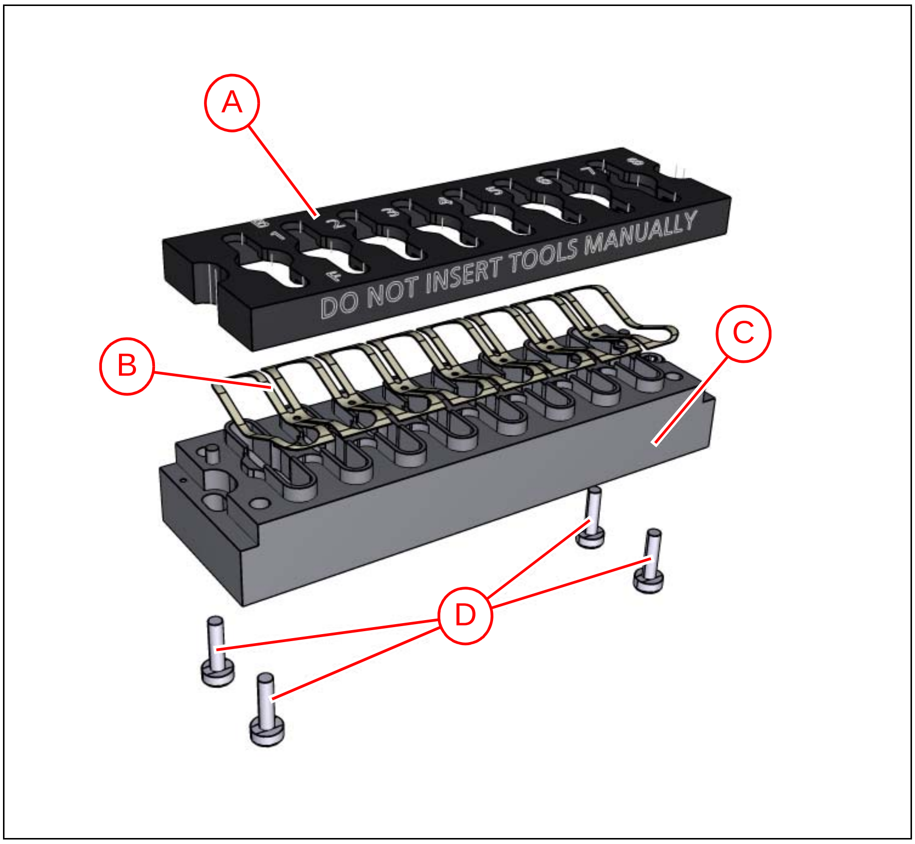


Figure 7-11. HYDRA tool bank parts.

Tool Bank Positions, Slots and Rows

A HYDRA tool bank can hold up to 16 tools in two rows ('2' in Figure 7-12) by eight tool positions.

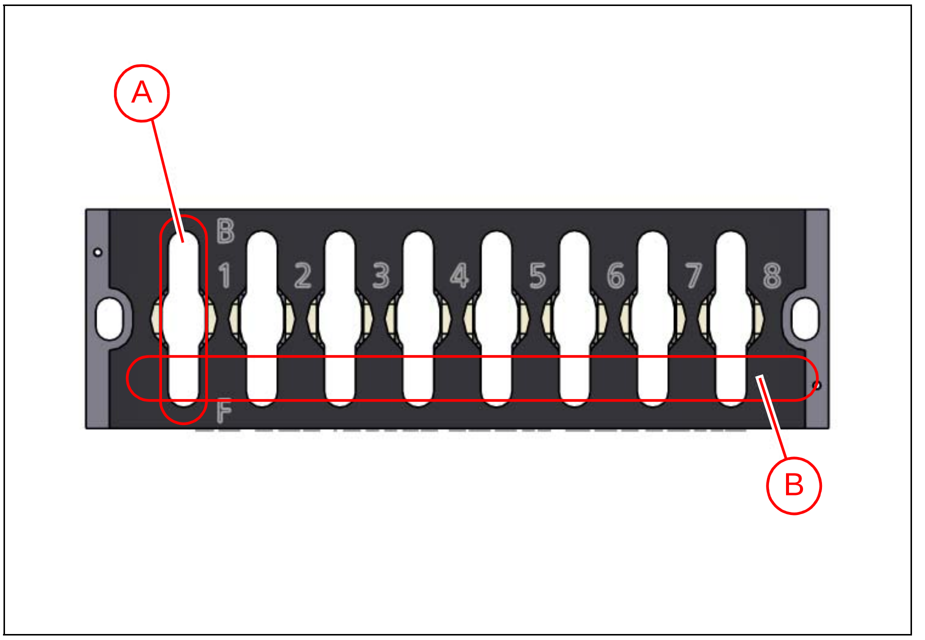


Figure 7-12. Tool bank positions, slots and rows.

- A slot ('A') has two positions, a front position and a back position.
- A tool position can hold one tool.
- The rows are called Front (marked 'F') and Back (marked 'B') corresponding to their Y positions in the tool bank. Front is the row facing the operator.

Installation and Removal

This section describes how to install and uninstall the HYDRA tool banks in the MY100 machine.

Installing HYDRA Tool Bank

This procedure is used to install the HYDRA Tool bank. Perform this procedure after installing a new HYDRA Tool bank or after replacing or moving the HYDRA Tool bank.

1. Select *Utility* > *Installation and Calibration* > *HYDRA Tool Utility* > *Install HYDRA tool bank*

2. Select the *Standard* tool option from the shown list.

3. Make sure the tool bank is empty.

CAUTION! If a tool is left in a tool position, then the tool tube for that position will most certainly be bent.

When prompted, confirm in the shown dialog box that the tool bank is empty.

4. Center the first fiducial mark, located to the left of the tool bank, by using the trackball and confirm.

5. Center the second fiducial mark, located to the right of the tool bank, in the same way as the first one.

TPSys will now measure the scale, angle and level for the tool bank, and if the tool bank seems to overlap an already installed tool bank.

If the measured values are inside the defined limits, the system will ask if you accept the scale and angle deviations.

If the values are outside the limits you must adjust the tool bank as described in section *Adjustments* on page 7-15.

If you accept, then the installation is complete.

6. You can now insert tools in the tool bank as described in the *Operator's Manual.*

Uninstalling HYDRA Tool Bank

This procedure is used to uninstall a HYDRA tool bank from the system. Perform this procedure when you want to replace or remove a HYDRA tool bank.

☞ Make sure the HYDRA tool bank is empty from tools, before uninstalling the tool bank. Refer to the *Operator's manual* for instructions regarding the removing of tools. Uninstalling a non-empty tool bank means that the information about the inserted tools is lost and the tools must be removed manually.

---

1. Select *Utility* > *Installation and Calibration* > *HYDRA Tool Utility* > *Uninstall HYDRA tool bank*.
2. Select the tool bank to be uninstalled from the shown list in *Select HYDRA tool bank to uninstall* dialog box.
3. If the tool bank is not empty you have to confirm that you want to uninstall a non-empty tool bank. The tool bank is now uninstalled from TPSys.

Adjustments

This section comprises the following adjustments.

- *Adjust Tool Bank Angle*.
- *Overlapping Tool Banks*.

Adjust Tool Bank Angle

Perform this adjustment if the angle deviation was outside the defined limit during the tool bank installation.

1. Loosen the two tool bank mounting screws and tap it carefully to a correct position.
2. Tighten the two mounting screws.

Before continuing, run the *autoInstall* program and redo the *Max Safe Pos* measurement.

---

3. Run *Install HYDRA tool bank*, see page 7-13.

Overlapping Tool Banks

If the system senses that a tool bank seems to overlap another tool bank during the installation, the installation will fail. This will occur if you try to install a tool bank that is already installed.

8. Mechanical Centering and Verification

This chapter describes the mechanical centering system. It contains a description of the system, adjustment and calibration information.

WARNING! In this chapter, some of the procedures cause the machine to make movements. The below warning must be followed for such procedures. Procedures that cause the machine to make movements are marked with this sign next to the text. Before entering such commands, check the following: Ensure that there are no foreign objects on the assembly table, near the tool bank, or within the X wagon, Y wagon, or Tray Wagon Magazine moving areas. Ensure that the Midas *mount head and the HYDRA tools are in their upper positions.*

System Description

The mechanical centering system centers and aligns the components mechanically when held by the Midas mount tool. It is called C-60.

Depending on machine model (MY100SX or MY100DX) the MY100 machine can be equipped with one or two centering units. The MY100DX model is outfitted with two centering units, one on each X wagon.

The mechanical centering system is also a mechanical and electrical verifier system that verifies the component dimensions and electrical values prior to placing the components.

To center a component the centering jaws have to move simultaneously, that is achieved with 0.3mm thin steel belts (3 pcs). One of the steel belts is attached to the motor pulley and thereby makes sure that the movement is correct. The transducer reads the position of the jaws and reports back to the servo. The smallest value on the encoder is when the jaws are closed.

Right Centering Unit

The right centering unit is exactly the same as the centering unit used on the MY series of machines, except that the board CMB3 (Centering Motor Board 3) has been replaced by the new board CMB3-R (Right) ('A' in Figure 8-1).

The micrometer adjustment screw ('B') on the centering device has been removed since it is no longer needed to compensate for any C misalignment.

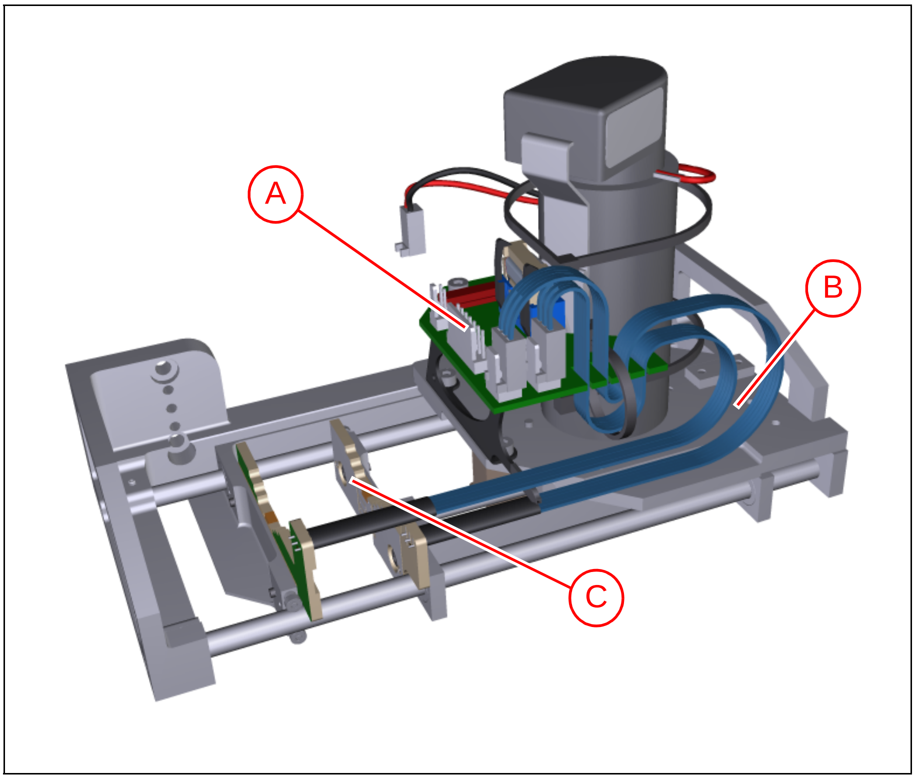


Figure 8-1. Right centering unit.

Left Centering Unit

MY100 DX machine is equipped with two centering units one on each X wagon. The left centering unit is very similar to the right centering unit but the unit is mirrored.

The centering jaws are also mirrored (compare with 'C' in Figure 8-1). The left centering unit uses the new board CMB3-L (Left).

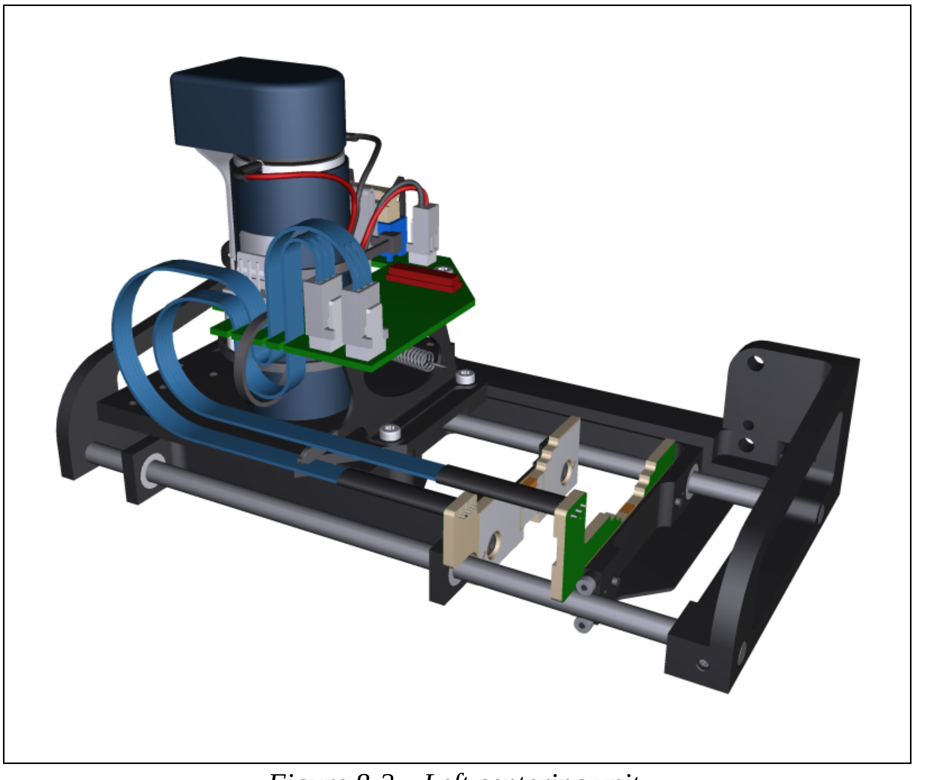


Figure 8-2. Left centering unit.

Mechanical Centering

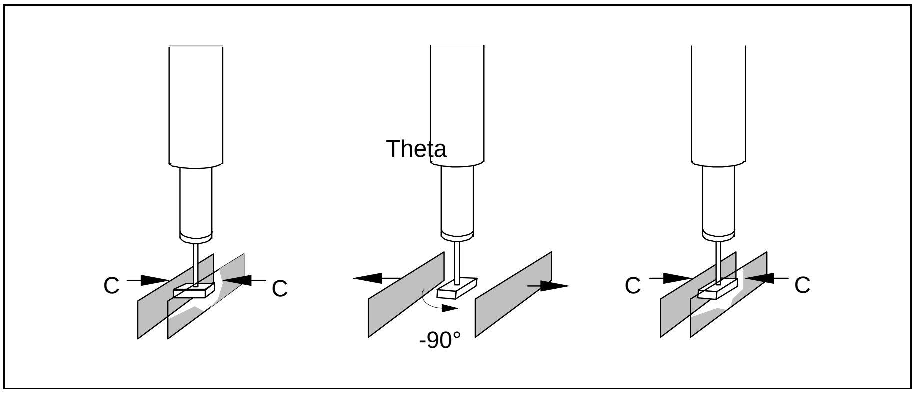


Figure 8-3. Centering and verifying.

Two centering jaws move symmetrically in a C movement towards each other, see Figure 8-3. They move until they both touch the component. The component is moved to the rotational center of the tool (centering and aligning). In this position the external dimensions and electrical data are verified. The centering jaws then retract.

The assembly process continues if the component was not rejected at the verification above. A rejected component is put into a reject bin, put back, or manually removed.

For most common packages the tool with the component is rotated 90° by the Theta movement to be centered and verified a second time. Packages can be programmed to use up to twelve mechanical centering phases. See the *Programming Manual* for more information.

Mechanical Verification

Mechanical verification means that the centering jaws measure the external dimensions of the component during mechanical centering. The component dimensions specified in the package list are used at this verification. Components that do not meet the mechanical specifications are rejected, see the next section.

Electrical Verification

Electrical verification means that electrodes on the centering jaws measure electrical parameters of the component during the mechanical centering. Component values and tolerances defined for each component are used during this verification.

Components that do not meet the electrical specifications are rejected.

The electric verification of a component is done by the 3PT1, Three Pole Test board.

Electrical System

Schematics

All schematics regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

CMB3 board

- The CMB3 (Centering Motor Board 3) is located on the C-60. CMB3 is a connector board for the motor and encoder.
- Depending on machine model (SX or DX), MY100DX has two different CMB3 boards, one is used on the right centering unit and is named CMB3-R (C Motor Board 3 - Right). The other one is named CMB3-L (C Motor Board 3 - Left).

Centering electrodes

- The two centering electrodes are small PCB's that are used to center and measure the component electrically.

Functional Test

Some functional tests can be performed on the mechanical centering system. For example measuring friction on the centering motor. It also possible to view friction limits.

Refer to Chapter *Appendix A - Service Program Reference Guide* for information about available commands.

Adjustments

This section describes how to adjust the mechanical centering unit to compensate for any C misalignment in the centering device. This adjustment must be measured if the centering jaws have been loosened or replaced.

1. If you are currently running TPSys, select *Exit* > *Shutdown*
2. Switch the power off.
3. Depending on machine model, loosen the screws holding the motor plate as follows.
   – On the right centering unit, use an **Allen** key to loosen four locking screws ('A' in Figure 8-4). Make sure the motor plate moves freely.

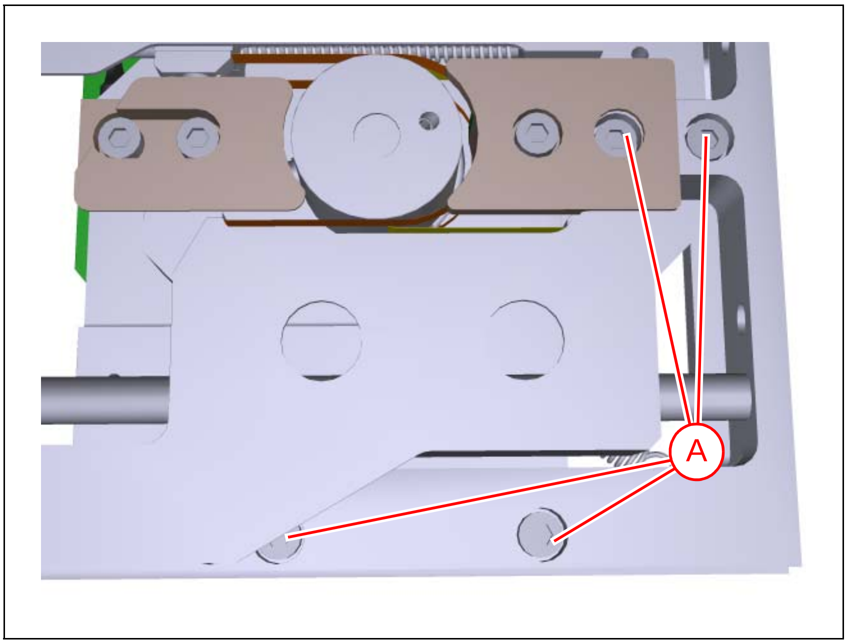


Figure 8-4. Loosen locking screws, right centering unit (Bottom view).

– (MY100 DX) On the left centering unit, use a **torx** key to loosen three locking screws ('A' in Figure 8-5).

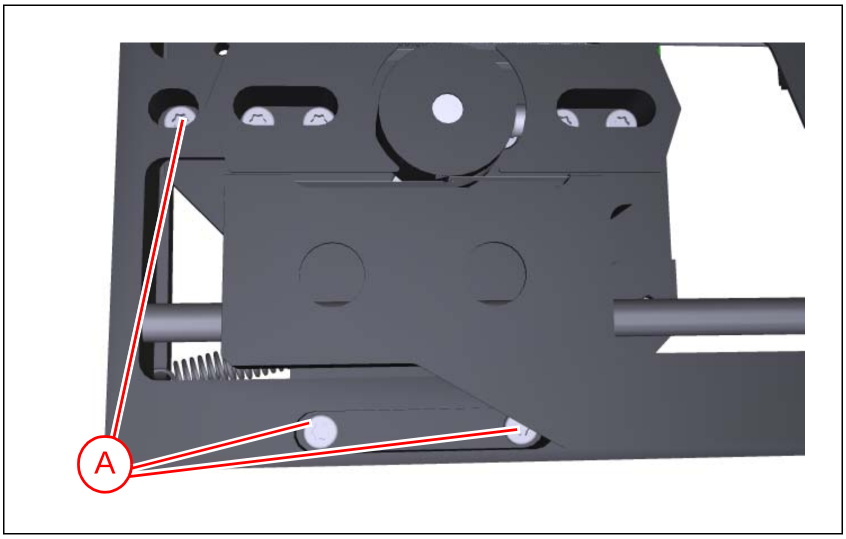


Figure 8-5. Loosen locking screws, left centering unit (Bottom view).

4. Lower the Midas to the lowest level by bypassing the safety latches.
5. Align the centering jaws by pressing them tight against the tool holder on the Midas (see Figure 8-6).

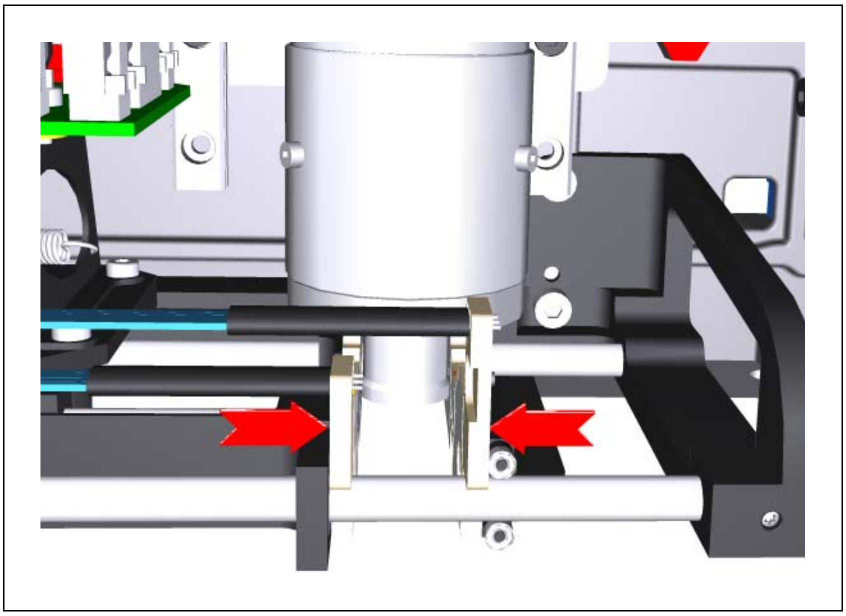


Figure 8-6. Align the centering jaws.

6. Tighten the locking screws (see Figure 8-4 and/or 8-5) on the motor plate while holding the centering jaws firmly.
7. Check the alignment by moving the centering jaws, the jaws should touch the tool holder on the Midas simultaneously.
8. Start TPSys and select *Utility* > *Installation and Calibration* > *Mechanical centering unit alignment.*
9. Follow the calibration steps required by TPSys. See Chapter 4 for details.
10. If necessary, repeat the procedure above until the offset value is within accepted range (60 micrometers).

Repair Guidelines

The following section describes how to replace the centering jaws on the mechanical centering unit.

Use only authorized parts, to keep original level of machine safety. Any damage or malfunction caused by the use of unauthorized parts is not covered by warranty or product liability. Improper maintenance, deficient installation and not verified products can lead to serious defects and early loss off system performance. In case of an incident, the use of not original products and spare parts has wide-ranging legal effects including the expiration of the national and international type approvals.

Replace Centering Jaws

1. Check the wiring before disconnecting the cables to the XTC board ('A' in Figure 8-7) so that you can reconnect properly.
2. Use an Allen key to remove the screws ('B') holding the centering jaw.
3. Replace the old centering jaws ('C').
4. Repeat the procedure on the second centering jaw.

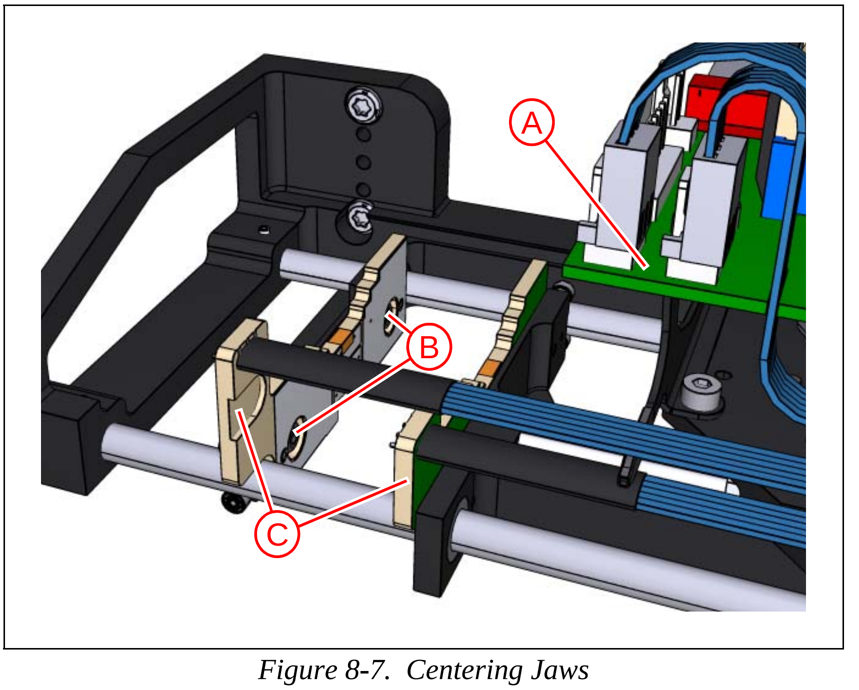


Figure 8-7. Centering Jaws

Make sure the cables can run smoothly by pressing the centering jaws gently together by hand.

5. Start TPSys and select *Utility > Installation and Calibration* to open the *CALIBRATION* window.
6. Perform all calibrations required by TPSys. See Chapter 4 for details.
7. Make a test assembling.

9. Vision Systems

This chapter contains a description of the different cameras and vision systems used on MYDATA placement machines.

This chapter describes the following vision cameras that is included in the different vision systems.

Positioning vision camera

– *X-Wagon Camera* on page 9-3.

Optical centering cameras

– *Standard and Dual Vision Camera* on page 9-10.
– *HYDRA Camera 2 (HC2)* on page 9-15.
– *Linescan Vision Camera (LVC)* on page 9-20.

Positioning Vision Camera

This section describes the X-wagon camera and positioning vision system. It contains a description of the system, adjustment and calibration information.

Depending on machine model (MY100SX or MY100DX) the MY100 machine can be equipped with one or two X-wagon cameras. The MY100DX model is fitted with two X-wagon cameras, one on each X wagon.

The positioning vision system consists of a camera located on the X wagon. This camera is used for acquiring images of boards, magazines and trays. The operator uses it to locate various objects in the machine.

CAUTION! Camera units contain components that can be damaged by improper handling. Do not put fingerprints on any optical parts. Avoid exposing the camera to a dusty environment. Mirrors and CCD cameras are factory adjusted and must not be readjusted.

X-Wagon Camera

The positioning vision hardware consists of a camera located on the X wagon, therefore called the X-wagon camera, see Figure 9-1. This camera faces downwards and is used for acquiring images of boards, magazines and trays. The operator uses it to locate various objects in the machine. The X-wagon camera is also used for machine calibration.

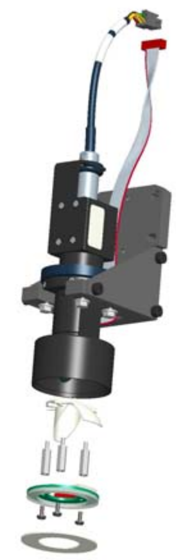


Figure 9-1. X-wagon camera.

TPSys is able to automatically analyze the images taken by the X-wagon camera. It can use these images to:

- Set the PCB coordinate system by finding the PCB reference fiducial marks.
- Locate magazine positions.
- Locate TEX tray pallets.
- Locate components on trays before picking them.
- Locate local fiducial marks to a component mount position.
- Locate calibration component and calibration plates.

CAUTION! Camera units contain components that can be damaged by improper handling. Do not put fingerprints on any optical parts. Avoid exposing the camera to a dusty environment. Mirrors and CCD cameras are factory adjusted and must not be readjusted.

Electrical System

Schematics

All schematics regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Electric Parts

XVLL (X-Wagon Camera LED Light)

The XVLL (X-Cagon Camera LED Light) board is located on the X-wagon camera and supplies the LED light on the X-wagon camera.

Power supply

Power to the X-wagon camera is distributed through the XFCB (X Frame Connector Board) and then to the XWZB (X Wagon Z Board) on top of the X wagon.

XWZB supplies the camera with +12V for operation and +24V for the LED light.

Adjustments

This section comprises the following adjustments.

– *Adjusting the X-Wagon Camera Focus*.

– *Adjusting the X-Wagon Camera Y Position*.

Instructions for calibrating the camera is found in Chapter 4 *Installation and Calibration*.

Adjusting the X-Wagon Camera Focus

This section describes how to adjust the X-wagon camera focus.

At delivery the camera's focus is preset to a nominal 23.7 mm. This is the distance between the lowest part of the camera's illumination unit, and the upper surface of the PCB on the Y wagon. Sometimes the camera focus may need adjustment.

Note that the camera has to be calibrated after this adjustment. Whenever a system has been adjusted, it is necessary to redo some or all calibrations on the machine. The calibrations that must be performed are automatically indicated in the calibration manager in TPSys. Refer to Chapter 4 for more information.

The area calibration plate in Figure 9-2 has multiple functions. The plate is used for adjusting the X-wagon camera focus, calibrating the camera optics and calibrating the place area.

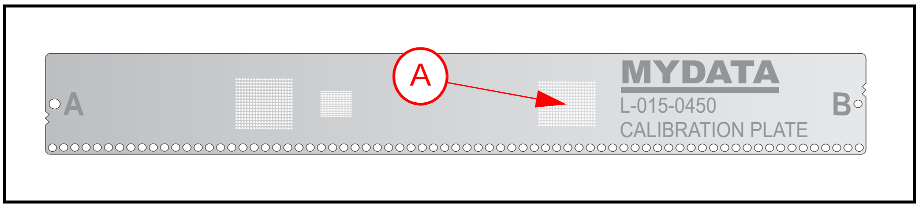


Figure 9-2. L-015-0450 Area calibration plate.

1. Start the calibration by selecting *Utility* > *Installation and Calibration* > *Calibration* > *X-wagon camera 1 calibration*
2. Follow the instructions presented on the screen.
   – If not already done, insert the area calibration background and area calibration plate (Figure 9-2) as described in Chapter 4.
   – When prompted, accept the positions that is automatically presented by the system.
   – When prompted, use the trackball to locate the fiducial marks ('A' and 'B') on the place the area calibration plate. Press <Enter> when ready.
   – When prompted to find a place to measure the board level on, determine if the location suggested by the system is appropriate then accept the position. Otherwise use the trackball to find a more suitable free space somewhere on the area calibration background.

3. When prompted, center the camera on the area calibration plate pattern ('A' in Figure 9-2).
4. Make sure the emergency stop button is pressed down.
5. Open the top cover and remove the front glass on the machine to gain access to the camera unit.

   On the front of the camera unit ('A' in Figure 9-3), about 15 mm below the camera, there are three holes. Two of them are threaded ('B').

   In each of the threaded holes there is a locking screw for the lens system. The unthreaded hole ('C') is used for focus adjustment.
6. Loosen one of the locking screws that locks the lens system ('B').

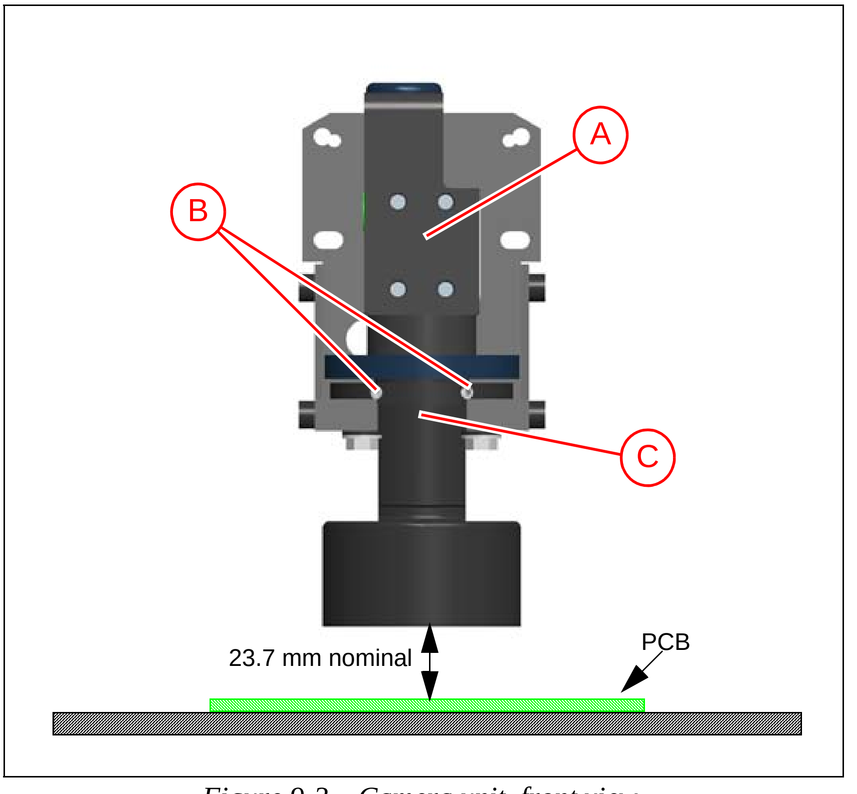


Figure 9-3. Camera unit, front view.

7. Insert a screw driver in the unthreaded hole ('C') and apply a gentle force.
8. Unscrew the other locking screw ('B') that holds the lens system. The lens system can now be moved up and down with the screw driver.
9. View the image on the monitor and adjust the focus.
10. When ready, tighten the locking screws before removing the screw driver.
11. Reinsert the front glass and close the top cover.
12. Release the emergency stop button.
13. If applicable, perform the procedure above on the second X-wagon camera.

Adjusting the X-Wagon Camera Y Position

This section describes how to adjust the X-wagon camera Y position.

At delivery the mount tool center line is set to be within the range of ±0.5mm compared to optical axis of the X-wagon camera. Sometimes it is necessary to adjust the camera's Y position to ensure that mount tool center line is within the accepted range. Follow the description below to adjust the X - wagon camera position.

Note that the camera has to be re-calibrated after this adjustment. Whenever a system has been adjusted, it is necessary to redo some or all calibrations on the machine. The calibrations that must be performed are automatically indicated in the calibration manager in TPSys (see Chapter 4). It is also necessary to re-install the tool bank(s) and re-adjust the magazine slot positions (see Chapter 7 and 13 respectively).

---

1. Start the procedure by performing the *Coarse measurement of Z-unit offset* calibration as described in Chapter 4.
2. If the presented result is **not** within the range of ±0.5mm. Then the camera's Y position needs to be adjusted as follows.
3. Press down the emergency stop button.
4. Open the top cover and remove the front glass on the machine to gain access to the camera unit.

5. Under the camera unit bracket ('A' in Figure 9-4) there are two locking screws on each side of the bracket ('B'). Slightly loosen these screws to adjust the cameras Y position.
6. When the locking screws have been loosened, the camera can be moved in the Y direction.
   - If the offset value is greater then **+0.5mm**, then move to camera **out** (towards the operator).
   - If the offset value is greater then **-0.5mm**, then move to camera **in** (away from the operator).

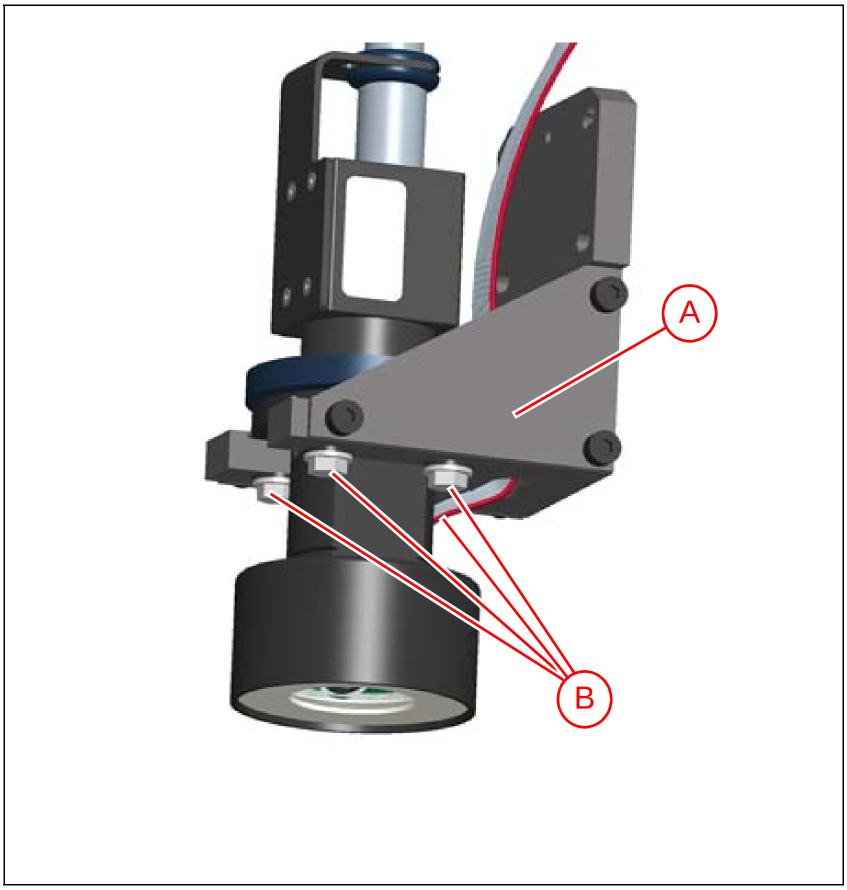


Figure 9-4. Adjust camera Y position.

7. Tighten the locking screws ('B' in Figure 9-4).
8. Release the emergency stop button.
9. Redo the *Coarse measurement of Z-unit offset* calibration to verify that the offset value is within the accepted range (±0.5mm).
10. When satisfied with the offset value, press down the emergency stop button, reinsert the front glass and close the top cover.

Note that the camera has to be re-calibrated after this adjustment. Whenever a system has been adjusted, it is necessary to redo some or all calibrations on the machine. The calibrations that must be performed are automatically indicated in the calibration manager in TPSys (see Chapter 4). It is also necessary to re-install the tool bank(s) and re-adjust the magazine slot positions (see Chapter 7 and 13 respectively).

Optical Centering Cameras

The optical centering system consists of a camera which acquires an image of a component held by a mount tool. The optical centering software identifies, inspects and calculates the exact position and angle of the component relative to the mount tool. The system then calculates the position and angle for the mount tool to place the component correctly on the PCB.

The MY100 machine can be outfitted with the following different optical centering systems.

- *Standard and Dual Vision Camera* described on page 9-10.
- *HYDRA Camera 2 (HC2)* described on page 9-15.
- *Linescan Vision Camera (LVC)* described on page 9-20.

CAUTION! Camera units contain components that can be damaged by improper handling. Do not put fingerprints on any optical parts. Avoid exposing the camera to a dusty environment. Mirrors and CCD cameras are factory adjusted and must not be readjusted.

Standard and Dual Vision Camera

The MY100 machine can be outfitted with one or two Standard or Dual Vision Cameras (SVC or DVC).
The camera or cameras are located in the left or right gable of the machine frame (see Figure 9-5).

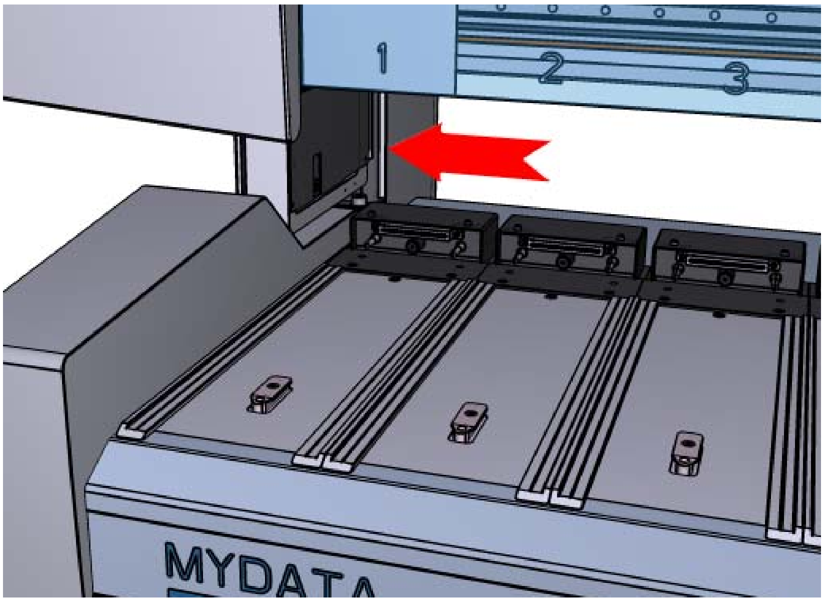


Figure 9-5. Standard or dual vision camera location.

System Description

SVS, Standard Vision System

The SVS, Standard Vision System, is a single camera system with a field of view (FOV) of 56 mm x 52 mm. This system is intended for optical centering and inspection of a wide range of parts, from SO packages with only a few leads to large fine pitch QFP packages and BGA packages with generic bump patterns.

The camera unit is called SVC, Standard Vision Camera. The SVC camera unit is shown in Figure 9-6.

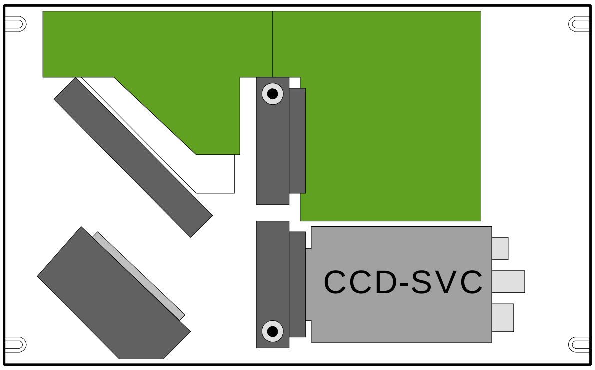


Figure 9-6. SVC camera unit.

DVS, Dual Vision System

The DVS, Dual Vision System, is a camera system with two different fields of view (FOV's), 56 mm x 52 mm. for the standard camera and 15 mm x 15 mm for the high resolution camera (HRC).

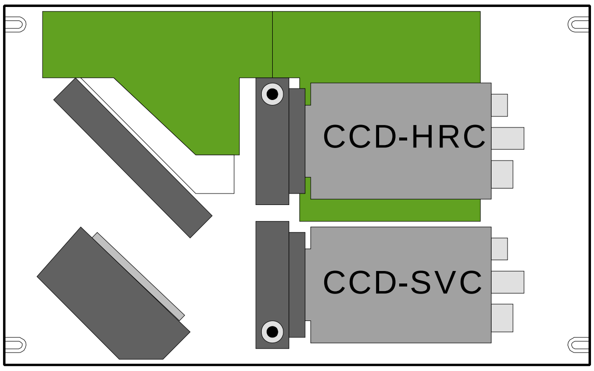


Figure 9-7. DVC camera unit.

Programmable Illumination

This vision system has an illumination unit with LED's divided into three areas that can be programmed individually creating Dark field light, Ambient light and Front light.

This gives many options in light settings for a package. The illumination is symmetrical (on all four sides)

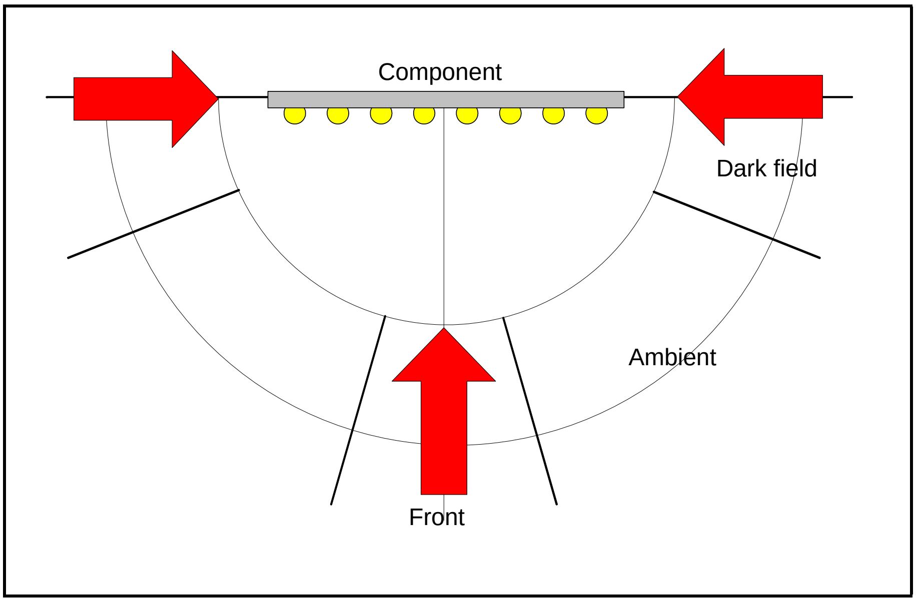


Figure 9-8. Programmable illumination.

Electrical System

Schematics

All schematics regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Electrical parts

OCLDH-L (Optical Centering LED's High Intensity - Left)

This is the device that supplies the light in the optical centering camera. The board is located on the left side of the camera unit.

A complete unit consists of the following four boards.

- OCLDH-L (Optical Centering LED's High Intensity - Left)

  This is the main board containing the control circuitry and some LED's, the following three boards only contain LED's.
- OCLDH-R (Optical Centering LED's High Intensity - Right)
- OCLDH-B (Optical Centering LED's High Intensity - Back)
- OCLDH-F (Optical Centering LED's High Intensity - Front)

Power supply

The power to the DVC is supplied from XFCB (X Frame Connector Board). The DVC uses +12V and the LED is supplied with +25V.

Adjustments

This section describes how to adjust the SVC or DVC Y position.

Instructions for calibrating the camera is found in Chapter 4 *Installation and Calibration*. Do not adjust a DVC unit mechanically if the SVC is calibrated. Only adjust the DVC unit mechanically when the HRC is calibrated.

Adjusting the SVC or DVC (Y position)

During the calibration of this camera (see *Optical Centering Calibration (SVC, HRC),(1 or 2)* in Chapter 4) it might become necessary to adjust the Y position of the camera unit mechanically. Follow the procedure below to adjust the camera's Y position.

1. To adjust the camera Y position, remove the camera cover. Loosen the four screws as depicted in Figure 9-9.

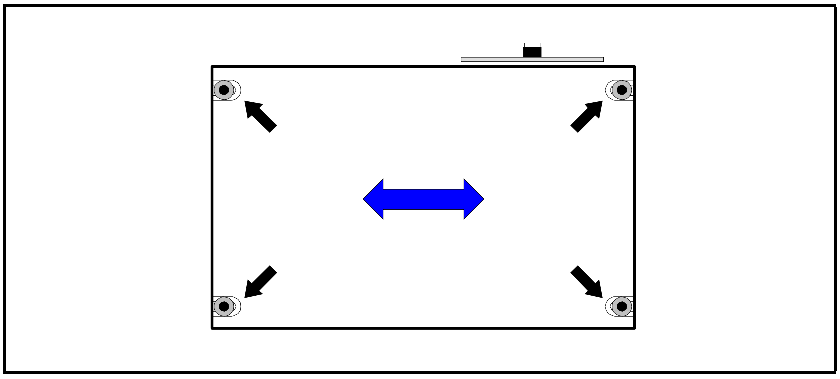


Figure 9-9. Dual Vision Camera.

2. Adjust the camera unit, in the Y-wise direction, until the crosshairs are centered to the calibration pattern (Calibration plate L-029-0506-3). See Figure 9-10.

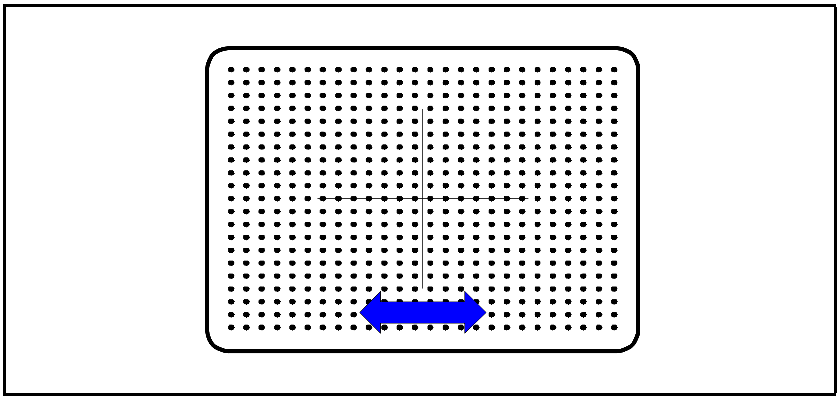


Figure 9-10. Calibration pattern.

3. Tighten the four screws and check that the calibration pattern is still centered. If not, loosen the screws again and repeat the adjustment described above.
4. Confirm in TPSys that the Y adjustment is completed.

HYDRA Camera 2 (HC2)

The HYDRA Camera 2 (HC2) is designed to fit together with the T-series board handling system. The previous camera model HVC (HYDRA Vision Camera) does not fit inside the T-series covers.

System Description

The HYDRA camera takes images of components picked by the HYDRA unit. It takes an image of four components in one shot. When inspecting components, two consecutive images are taken while the HYDRA unit passes over the camera. The position when to take the images is determined by the following three parameters.

- 52.0206 Position; X position
- 24.0201 Centering; Flash offset 1
- 24.0202 Centering; Flash offset 2

The optics in the HC2 is different from the other vision cameras, it gives different resolution in X and Y; 81 x 45 microns. The minimum pitch, chip size is dependent on presentation angle. It has only ambient non-symmetric illumination which might give different appearance in 0 and 90 degrees. The HC2 only has one intensity for illumination.

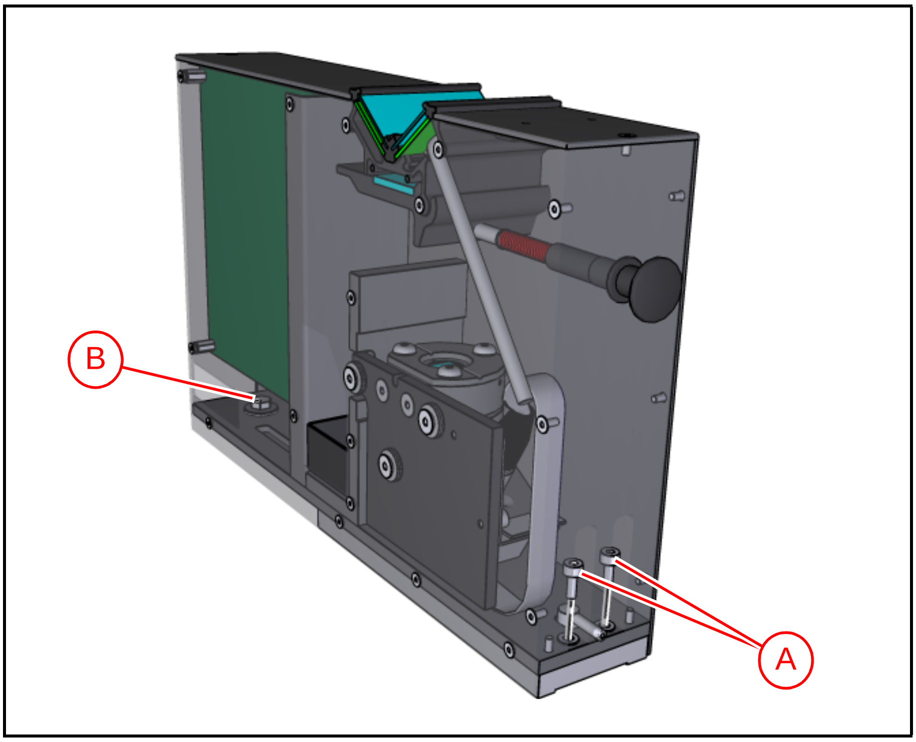


Figure 9-11. HC2 mount screws.

The camera box is mounted on the machine table using three screws at the bottom of the camera box, extending through a steel plate.There are two Allen screws ('A' in Figure 9-11) at the front and one bolt ('B') at the back of the unit.

HC2 Dump Bin

To protect the lens from dust and components there is a transparent gate ('A' in Figure 9-12) in the camera box that is controlled with a lever ('B') from the front.

Pulling the lever in the front will cause the transparent gate to tip down and any components on the transparent gate will fall down to the bottom of the camera into a dump bin ('C') and can then easily be removed.

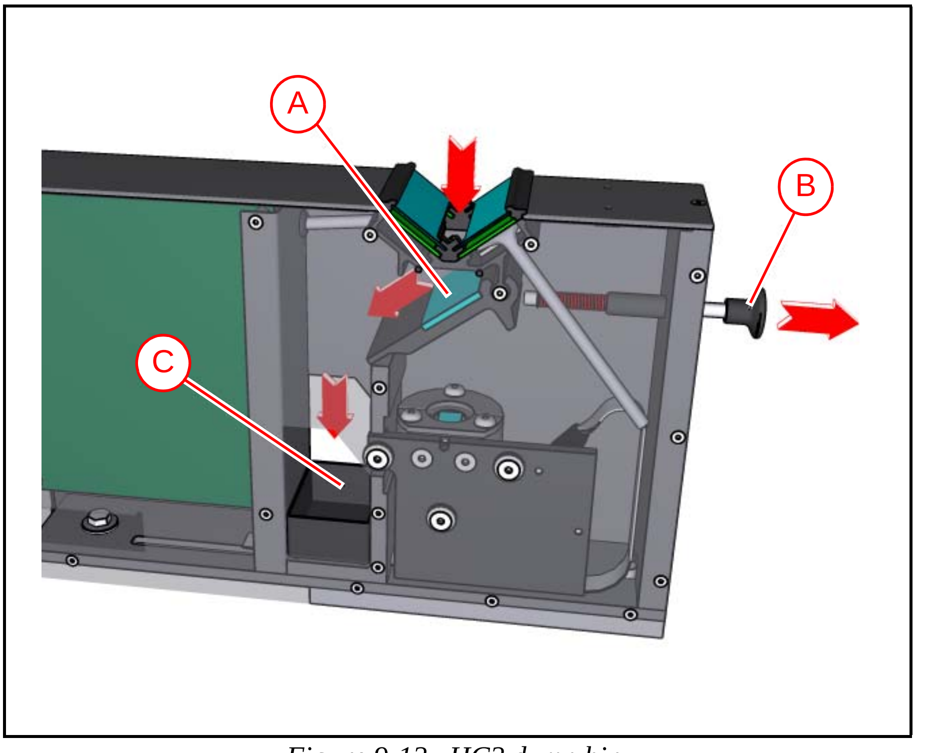


Figure 9-12. HC2 dump bin.

Electrical System

Schematics

All schematics regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Electrical parts

HLCC (HYDRA LED and Camera Control)

- The HLCC (HYDRA LED and Camera Control) board is located inside the HYDRA camera unit.
- This board controls the HYDRA camera and HYDRA illumination (HLB board). Two HLB boards together with a HLCC board make up the HYDRA illumination box.

HLB (HYDRA LED Board)

- The HLB (HYDRA LED Board) is located on top of the HYDRA camera unit.
- This board is outfitted with LED's that provides the light in the HYDRA camera. Two HLB boards together with a HLCC board makes up the HYDRA illumination box.

Power supply

A video cable is connected directly into the VVG2 board and the power to the HVC2 is supplied from the XFCB (X Frame Connector Board).

Adjustments

This section describes how to adjust the Y position of the HC2 (HYDRA Camera 2).

Instructions for calibrating the camera is found in Chapter 4 *Installation and Calibration*.

Adjusting the HC2 (Y position)

During the calibration of this camera (see *Calibrate HYDRA camera optics (coarse), (1 or 2)* in Chapter 4) it might become necessary to adjust the Y position of the camera unit mechanically. Follow the procedure below to perform this adjustment.

1. Loosen the rear bolt, see ('A' in Figure 9-13).

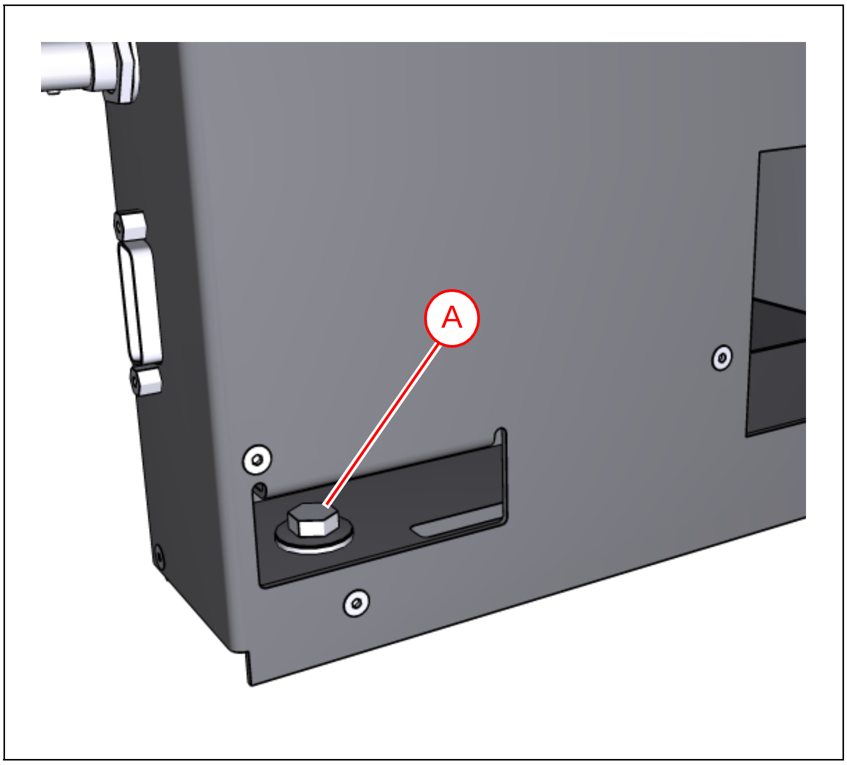


Figure 9-13. HC2 rear bolt.

2. Loosen the two screws located at the front of the camera box ('A' in Figure 9-14).
3. Adjust the Y position of the camera with screw ('B'). By turning the screw clock-wise the camera will move towards the front of the machine (on the monitor it looks as if the camera is moving downwards).

   If you want to move the camera towards the rear, turn screw ('B') counter-clock wise while pushing gently on the camera.

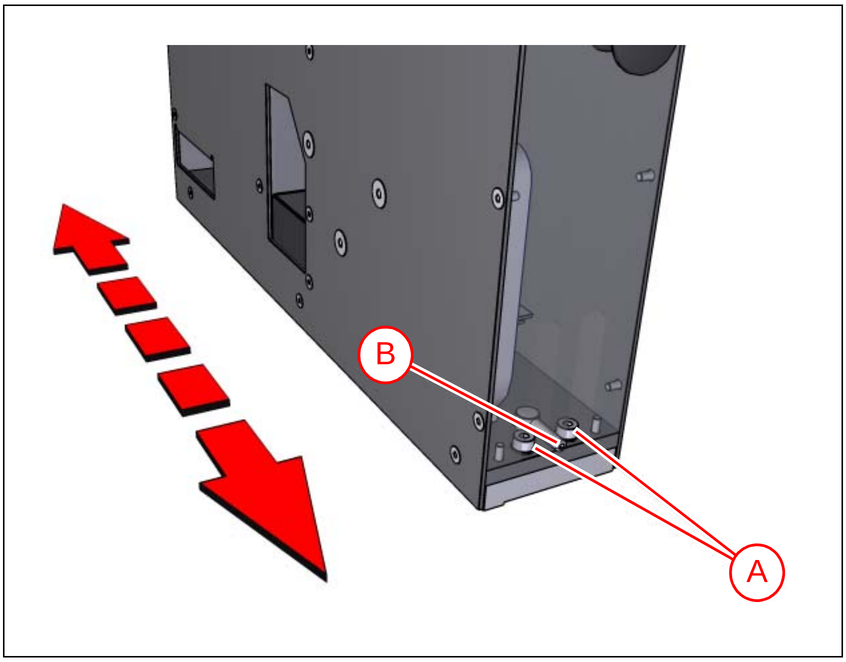


Figure 9-14. Adjust camera Y-position.

4. When satisfied with the Y position, fasten screws ('A') and the rear bolt (see Figure 9-13).

Linescan Vision Camera (LVC)

The Linescan vision system generates a picture by taking a series of line images synchronized with the position of the mount head as it passes over the camera. The final image is made up of thousands of such lines. The illumination of the component is done with ambient lighting.

Instructions for calibrating the camera is found in Chapter 4 *Installation and Calibration*.

System Description

The Linescan Vision System consists of the following hardware.

- *Camera box* on page 9-21.
- *LSAD (Line Scan Camera A/D-converter Board)* on page 9-22.
- *Power Supply* on page 9-23.

WARNING! In this section, some of the procedures cause the machine to make movements. The below warning must be followed for such procedures. Procedures that cause the machine to make movements are marked with this sign next to the text. Before entering such commands, check the following: Ensure that there are no foreign objects on the assembly table, near the tool bank, or within the X wagon, Y wagon, or Tray Wagon Magazine moving areas, and that the standard tool head and the HYDRA *tools are in their upper positions.*

Camera box

The most important part of the LVS is the Linescan camera (LSC). Inside the camera box there is a mirror ('C' in Figure 9-15) that reflects the image to the 2048 x 96 pixel CCD ('A'). There are also electronic boards ('B') needed to drive the CCD image sensor, and send the analog video signal to the LSAD board.

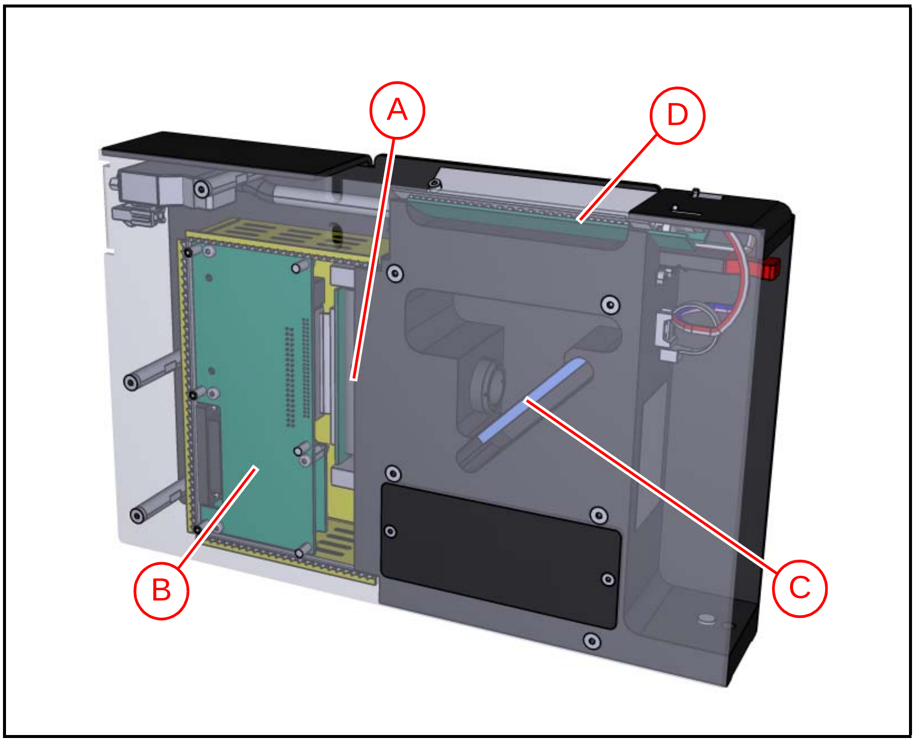


Figure 9-15. Linescan camera unit.

The camera can be used as a 2048 x 96 pixels area camera, which is useful for calibration and troubleshooting. This mode is for example used in the service program.

The focal plane is factory-set at 14 mm above the camera frame. This is not possible to adjust. There are no serviceable parts inside the camera box, except for the glass window and the LED boards ('D'). To avoid vibrations or relative movements between the CCD and the lens, all optical elements are glued to a steel frame. This frame is made from a single solid block of metal.

The illumination unit has two separate light segments. The LED current is constant (50 mA per diode). The light intensity is varied by changing the duty cycle.

Electrical System

Schematics

All schematics regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Electrical parts

LSLD (Line Scan LED Board)

The LSLD (Line Scan LED Board) is located inside the Linescan camera and handles the tapered illumination.

LSSA (Line Scan Sensor Adapter Board)

The LSSA (Line Scan Sensor Adapter Board) holds the CCD sensor and clock drivers.

The boards LSSA+LSSB+LSSC are all located inside the Linescan camera and work as together as a CCD clock driver and video buffer.

LSSB (Line Scan Sensor Adapter Board)

The LSSA (Line Scan Sensor Adapter Board) holds the power filter, sequencing logic and clock drivers.

LSSC (Line Scan Sensor Adapter Board)

The LSSA (Line Scan Sensor Adapter Board) holds DC restoration circuits and video cable drivers.

LSPW (Line Scan Power Board)

The LSPW (Line Scan Power Board) is part of the line scan camera system. It provides power for the camera box and current drivers for the LED boards (LSLD).

LSAD (Line Scan Camera A/D-converter Board)

An LSAD (Line Scan Camera A/D-converter Board) is mounted inside the CB3 box (see Chapter11 *Power Supply and Electronic System*) and performs several functions. The LSAD board is accessed via the VVG2. Only +5 V and GND are connected to the ISA-bus.

- It provides the camera box with line synchronization based on HFLASH.
- Switches the LED boards on and off.
- AD converts the 8 channel analog video and feeds the data to the 4 MB video memory on VVG2.
- It compensates for gain and offset variations between the 8 channels of the camera's CCD-sensor, using a Look Up Table (LUT).
- Controls the camera electronics via a serial link.

Power Supply

The Power unit is mounted behind the Linescan camera and supplies it with six different voltages: +15 V, +13.5 V, +12 V, +5 V, –2 V and -5 V.

Figure 9-16. Linescan power supply.

The Power unit also supplies the drive current for the LED boards. If the LED boards are kept on for too long, a watch-dog will automatically switch them off, preventing the diodes from over-heating due to a faulty cable or LSAD board.

Two green LED indicate camera power OK and LED power OK.

Installation and Removal

This section comprises the following installations and removal procedures.

- *Installing and Removing the Camera Unit* on page 9-24.
- *Installing and Removing the Power Supply Unit* on page 9-25.
- *Connecting the Camera Unit and Power Supply Unit* on page 9-26.

Installing and Removing the Camera Unit

1. Remove one of the side covers ('A' in Figure 9-17) on the camera to gain access to the rear attachment screw position ('B').

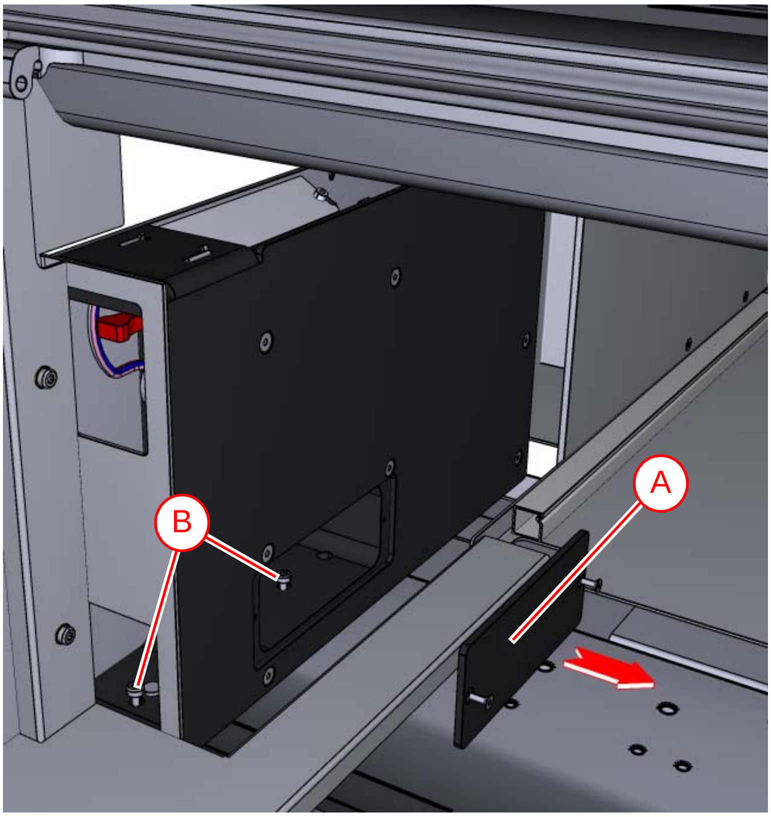


Figure 9-17. Mount the Camera Unit.

2. Use two M6 screws ('B') to mount the camera to the machine frame. No adjustments are necessary.

Removing the Camera Unit

Refer to installation procedure in reverse order.

Installing and Removing the Power Supply Unit

1. Remove the four screws ('C' in Figure 9-18) from the Power Supply Unit casing ('A').
2. Use the previously removed screws to mount the Power Supply Unit to the rear conveyor hoods gable ('B'). No adjustments are necessary.
3. The cables connecting the Power Supply Unit to the Linescan camera are stored under the cover plate between the two units ('D').

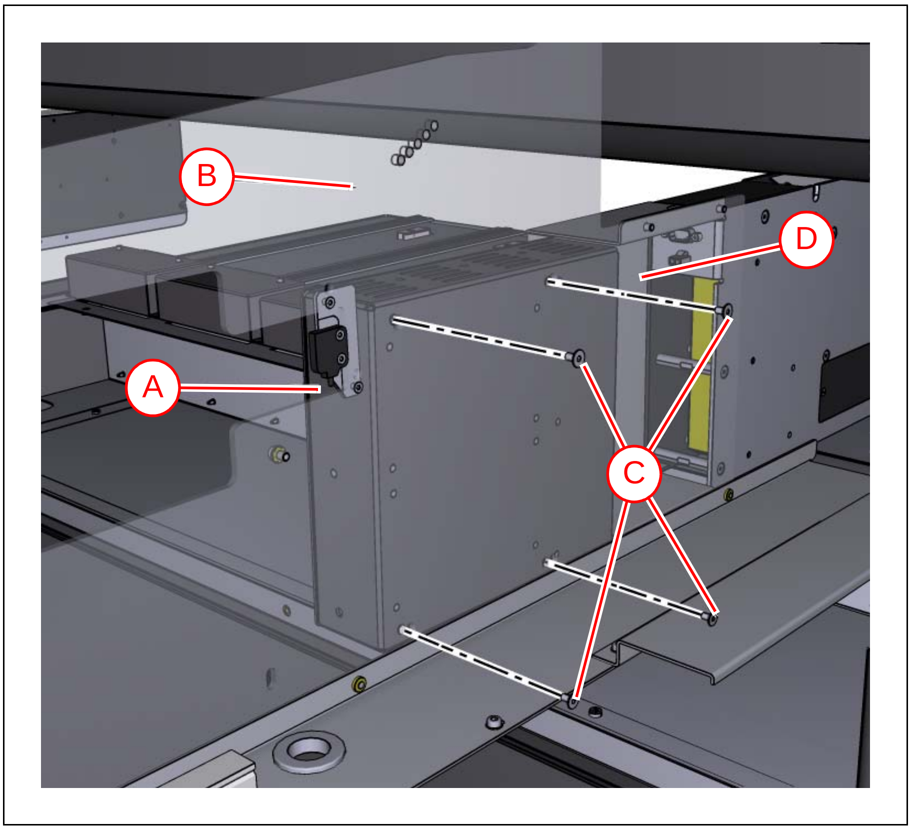


Figure 9-18. Attaching the Power Supply Unit.

Removing the Power Supply Unit

Refer to installation procedure in reverse order.

Connecting the Camera Unit and Power Supply Unit

☞ Turn main power switch to '0' position before continuing the installation. Otherwise the Camera Unit and/or Power Supply Unit may be seriously damaged.

1. Connect multi video cable L-019-0868 between the camera box ('A' in Figure 9-19) and LSAD – XVIDEO (located in CB3 box).
2. Connect power cable L-019-0869 between the camera box ('B') and power supply unit – XPOW ('C').
3. Connect LED control cable L-019-0870 between LSAD-XLSPW (located in CB3 box) and power supply unit – XLSAD ('D').
4. Connect LED drive cable L-049-0202 between the camera box ('E') and power supply unit – XLSLD ('F').
5. Connect AC cable K-019-0335 between the power supply unit – XAC ('G') and the 230V socket in the EPT3 unit.
6. Gather all cables in the compartment between the Power Supply Unit and the Linescan camera (see 'D' in Figure 9-18).

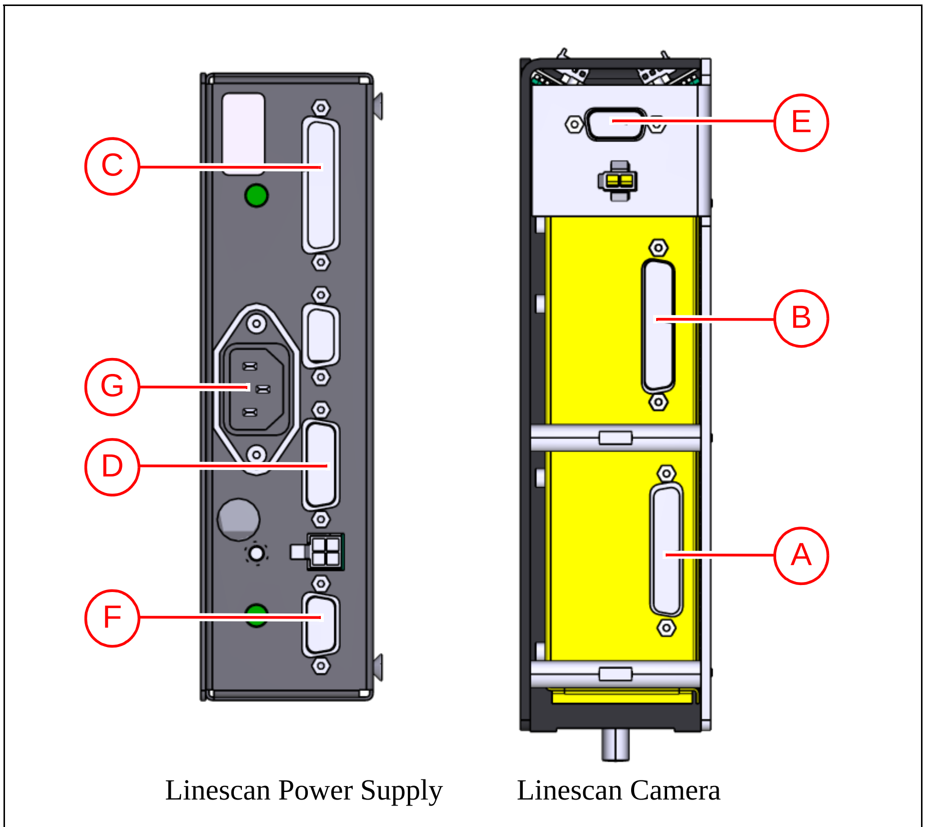


Figure 9-19. Cabling.

Troubleshooting

Refer to the table below if you have problems with the Linescan Camera.

Symptom	Possible reason
Calibration fails.	Calibration plate touches centering jaws when rotated. Try setting parameter 73.0003 or 74.0003 to –13.5 mm.
	Ensure that you have installed the reference background correctly.
Cannot find the reference background.	Camera or reference background incorrectly mounted in Y direction. The entire reference background (7x56 mm) should be visible in the left most channel (pixels 0-255).
	Reference background dirty, bent, damaged or not installed.
LED boards not illuminating.	Light intensity in package data set to 0 %.
	Power unit or LED cable damaged.
Blurred image in both vertical and horizontal direction.	Incorrect component height in package data.
	Camera level incorrectly measured.
	Centering unit mounted in upper position.
	Magnification incorrectly measured during calibration.
Blurred image only in vertical direction.	X wagon traveling too fast over camera. Try lowering parameter for max X speed 57.0211 (also 58.0211 if you have two LSCs).
Vertical stripes in image.	Look-up-table calibration failed.
	LED cable shield damaged.
	Power unit or power cable damaged.
	Video cable damaged.
Dark image.	Calibration failed.
	LED boards or power unit damaged.
Dark spots in image.	Dirt on camera window.
	Components on the camera glass.
Bad placement accuracy.	Dirt on reference background.
Slow mounting.	Max-safe-pos incorrect.
	View mode or debug mode on.
	Incorrect tool parameters.
Level of camera box not repeatable.	Midas touches LED board Plexiglas cover when measuring camera box height. Loosen screws holding Plexiglas over LED boards, push down, and re-tighten screws.

10. Pneumatic System

This chapter briefly describes the pneumatic system. The chapter is divided into the following sections:

System Description

The pneumatic system is used to obtain a negative pressure in the Midas or HYDRA mount head tool when picking and moving parts. The system also consists of different valves that are used to turn off the vacuum and connect the nozzle to ambient air pressure in order to quickly release parts when placing the components.

Depending on machine model (MY100SX or MY100DX) the MY100 machine can be equipped with one or two vacuum systems. The MY100DX model is outfitted with two vacuum systems, one for each X wagon.

A schematic of the pneumatic system is shown in Figure 10-1.

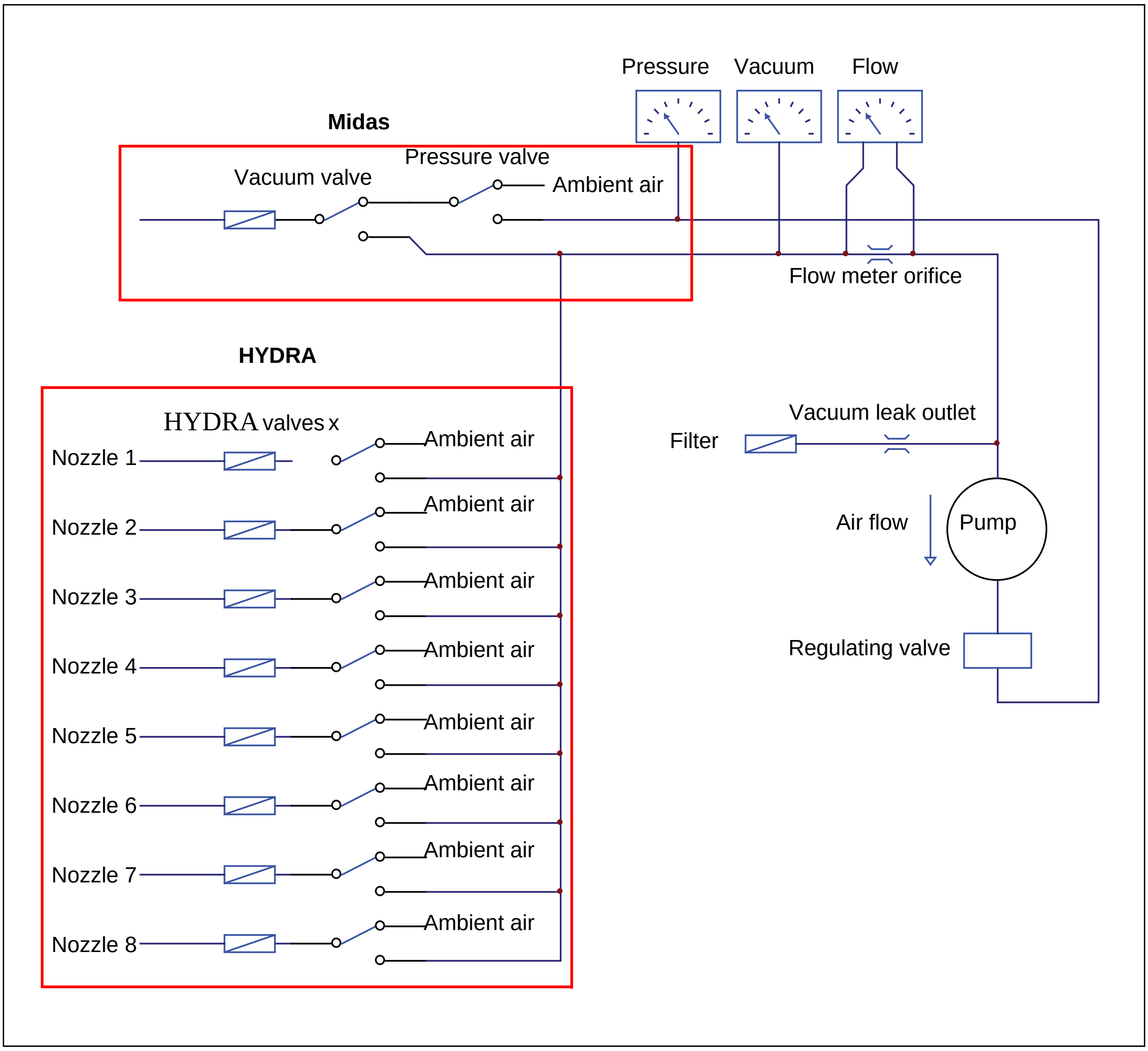


Figure 10-1. Pneumatic system.

Vacuum Pumps

The MY100DX is equipped with two vacuum pumps, one for each X wagon. The right pump ('B' in Figure 10-2) generates pressure and vacuum for the right X wagon. The left pump ('A') generates pressure and vacuum for the left X wagon. The pumps are located in the lower right compartment of the machine, and can be accessed by removing the lower right gable cover.

MY100SX only has one vacuum system which includes the right vacuum pump.

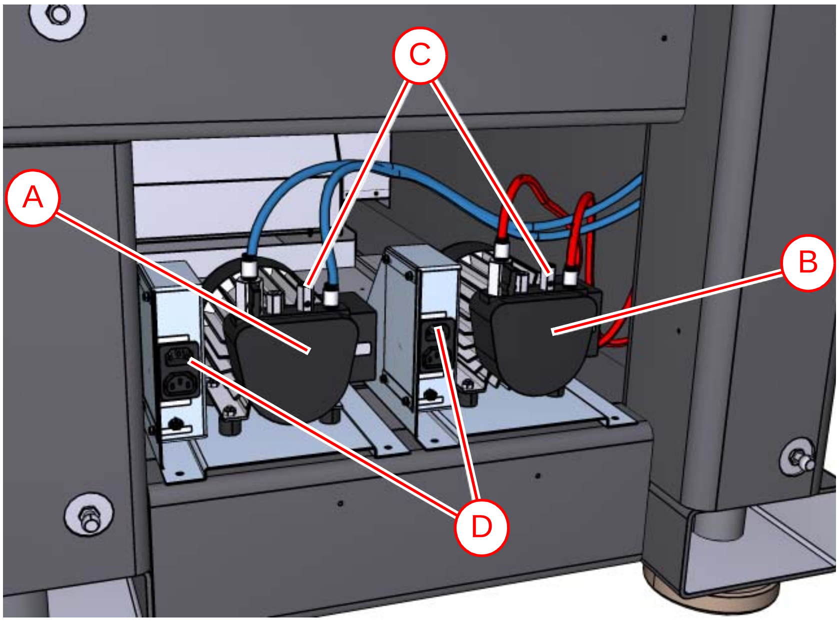


Figure 10-2. MY100DX vacuum pumps.

The pump has the following two major purposes:

- Generate vacuum used for component pick up.
- Generate a slight overpressure that is used to release parts from the nozzle when placing parts with the Midas head.

The overpressure is generated from the exhaust side of the pump, and to guarantee some flow through the pump when all vacuum valves are closed there is a small leak outlet on the vacuum side. The over pressure is then regulated to a low level with a regulating valve.

The small leak outlet on the vacuum side has a small filter ('C').

The power inlets to the pumps are located at ('D' in Figure 10-2).

Vacuum and Pressure Hose Routing

The hoses ('B' in Figure 10-3) with vacuum and pressure are routed from the pump ('A') along the back side of the machine, up and through the cable chain ('C') and ends in the X-wagon vacuum block ('D').

The MY100 DX machine has two identical set of hoses to provide vacuum and pressure for the left and right X wagon.

- The red colored hoses in Figure 10-3 are connected to the right vacuum pump and the right X wagon. This is the system used in the MY100SX model.
- The blue colored hoses in Figure 10-3 are connected to the left vacuum pump and the left X wagon. This system is only available in the MY100DX model.

In reality all hoses has a blue color.

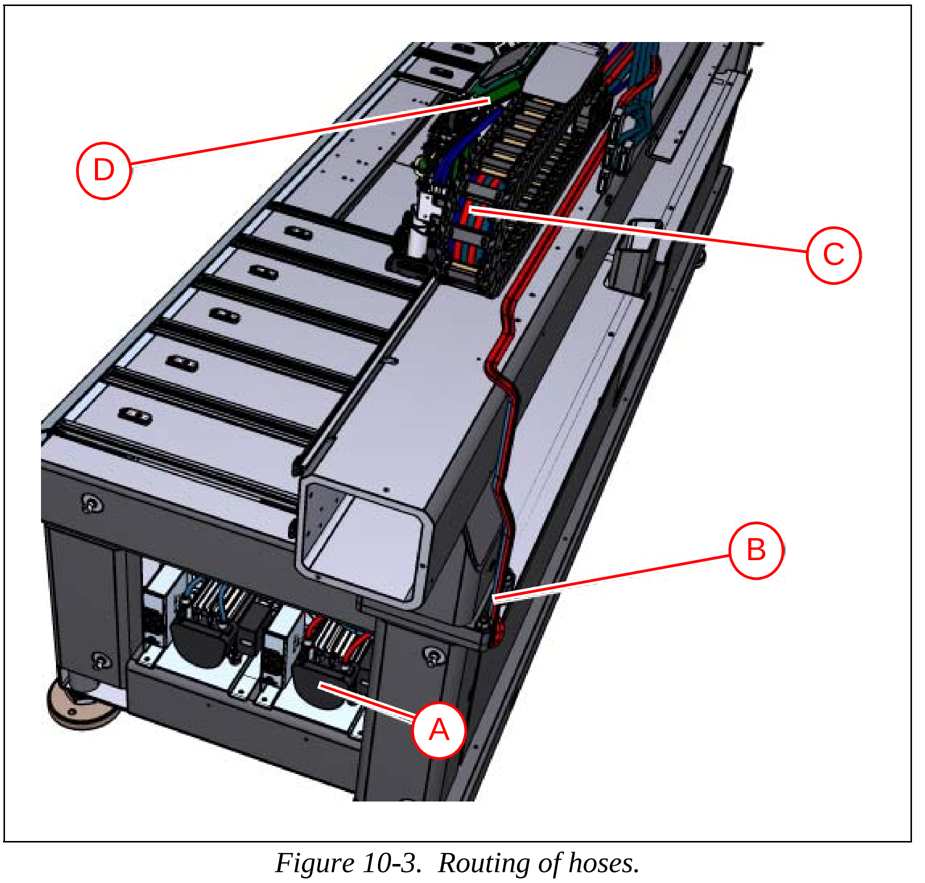


Figure 10-3. Routing of hoses.

Vacuum and Pressure Sensors

The vacuum hose ('B' in Figure 10-4) and pressure tube ('C') are connected to the vacuum block ('A') on the X wagon.

The hose indicated ('E' in Figure 10-4) routes vacuum to the HYDRA unit. Hose ('D') supplies the Midas unit with vacuum or pressure.

The sensors are located in the vacuum block ('A') on the X wagon, co-located with the valves for the Midas head.

There are three different sensors in the system, a vacuum sensor on the vacuum line, a pressure sensor on the pressure line and a flow sensor on the vacuum line. The flow sensor is actually a high sensitivity pressure sensor measuring the decrease in pressure over a large outlet.

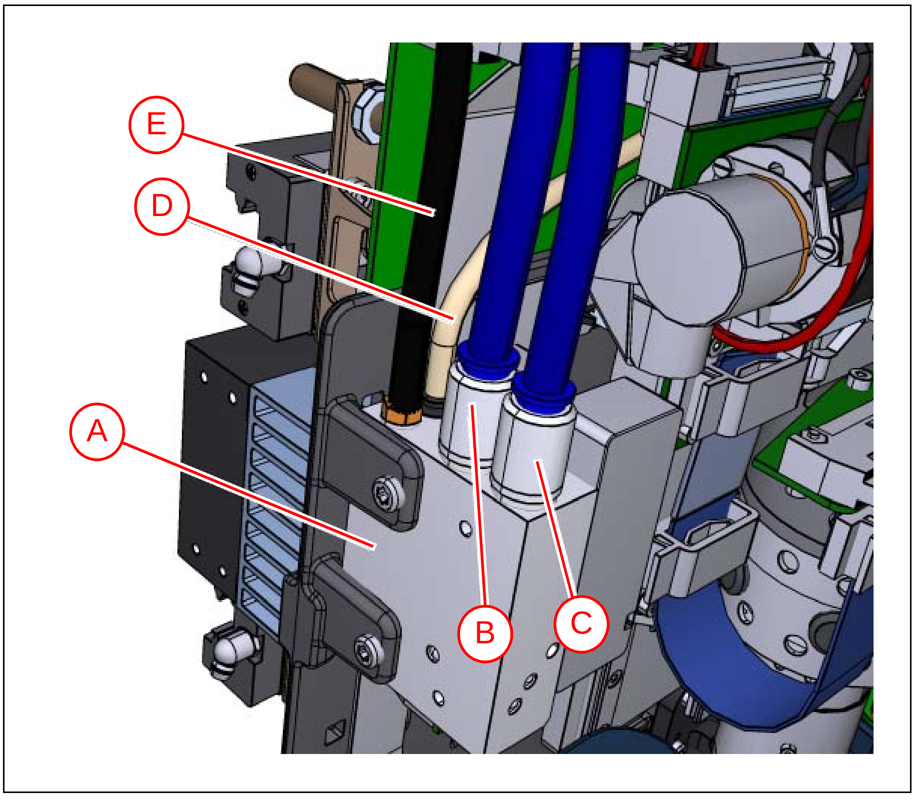


Figure 10-4. Vacuum block.

The switching on and off of the pump is controlled by the CanX board. The sensors are read by the CanZC board.

Midas Mounthead (Single Nozzle)

The Midas ('A' in Figure 10-5) is a single nozzle mounthead that is connected to two valves ('C') located on the vacuum block ('B') on the X wagon.

The first valve controls whether the nozzle should be connected to vacuum or not. If the nozzle is not connected to vacuum then the second valve controls whether the nozzle should be connected to air pressure or to atmospheric pressure.

The vacuum block also has a small filter on the line to the Midas nozzle.

When the Midas touches a component to be picked up, the first valve switches to vacuum to hold the component on the tool tip.

When the component has been placed on the board, the second valve switches to air pressure for a few milliseconds to quickly release the component from the nozzle. The valve then switches back to atmospheric pressure before the Midas moves up.

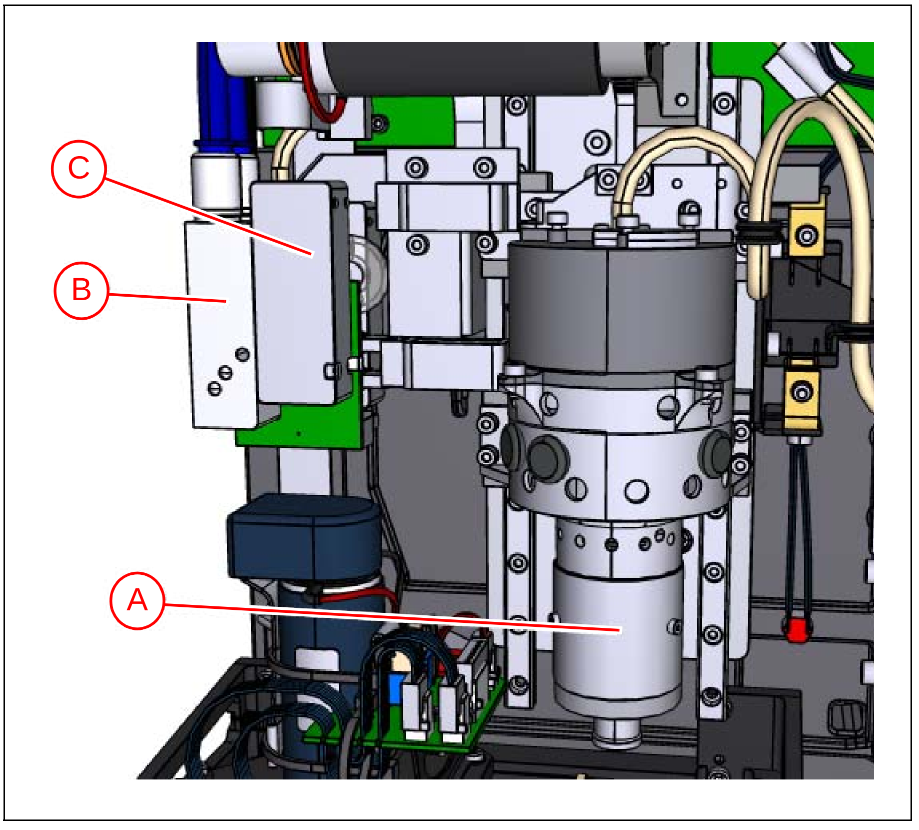


Figure 10-5. Midas Valves.

The Midas valves are controlled by the CanZC board.

HYDRA Mounthead (Multiple Nozzles)

The HYDRA mounthead is outfitted with eight individual nozzles ('A' in Figure 10-6) and an equal amount of valves ('B'). Each nozzle has a small filter ('C').

The HYDRA vacuum valves switches between vacuum and atmospheric pressure.

When the HYDRA touches a component to be picked up, the HYDRA vacuum valve switches to vacuum to hold the component on the tool tip.

When a component is placed on a board, the HYDRA valve switches from vacuum to atmospheric pressure and holds the valve open for a few milliseconds. This time is enough to clear the vacuum in the tool tip and thereby releasing the component from the tool tip.

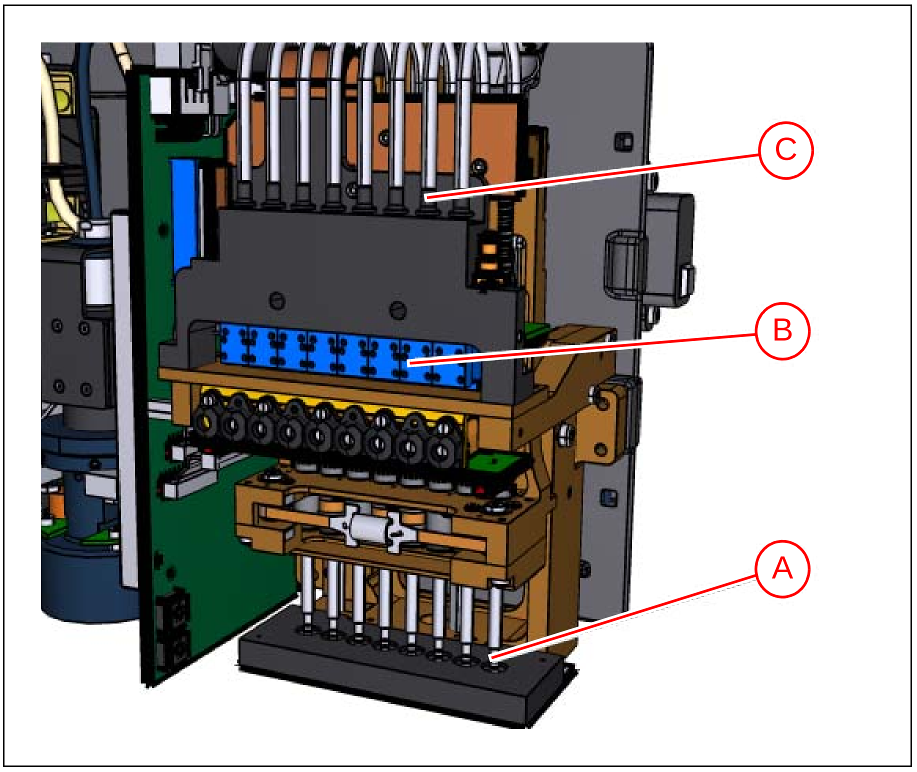


Figure 10-6. HYDRA valves.

The HYDRA valves are controlled by the CanHC board.

Functional Test

This section is divided into two parts, the first part describes how to measure and control the vacuum system from the service program. The second part describes how to perform different diagnostic tests from within TPSys.

Measure and Control Vacuum System

All vacuum and force values regarding the Midas and HYDRA mount heads can be monitored by performing the following procedure. It is also possible to individually control the pumps, vacuum valves, pressure valves from the *Vacuum[kPa]* menu.

☞ The description below describes the MY100DX model with two Midas and two HYDRA units.
The MY100SX model only has one Midas ('*Z*' in the Figure below) and the right HYDRA unit ('*1R*' to '*8R*').

Procedure

1. Select *Exit* > *Exit To Service*
2. To see the vacuum and force values for the Midas an HYDRA mount heads, select *Vacuum* > *Show/Hide vacuum/force sensors.*
   – When there is no vacuum or pressure in the system the viewer shows the zero-level offsets of the sensors. All values are presented in kPa.
   – The vacuum level is typically -80 kPa (i.e. 80% or -12 psi or 20 kPa absolute), and the overpressure is typically 30 kPa (i.e. 0.3 Bar or 5 psi).
3. You can individually control the pumps, the vacuum valves and the pressure valves by selecting one of the following options from the *Vacuum[kPa]* menu.
   – *Vacuum[kPa]* > *Vacuum[kPa]* controls the right Midas system.
   – *Vacuum[kPa]* > *Z2 vacuum* controls the left Midas system.
   – *Vacuum[kPa]* > *HYDRA vacuum* controls the right HYDRA system.
   – *Vacuum[kPa]* > *HYDRA2 vacuum* controls the left HYDRA system.

   In the shown dialog box, move the cursor to the desired option and press <Enter> when ready.

Vacuum Diagnostics for MY100

The introduction of a new vacuum system on the MY100 machines has enabled the diagnostics system to be updated. The new test system allows more extensive tests and an improved presentation of the results.

The Vacuum diagnostics has been divided into the following test sequences.

– *Automatic Diagnostic Test* on page 10-9.

– *Extensive Diagnostic Test* on page 10-12.

The diagnostics are invoked from *Utility* > *Diagnostics* > *Vacuum Test*. The operator can choose between an *Automatic* and an *Extensive* alternative.

Automatic Diagnostic Test

The automatic test is done without any assistance from the operator. It is also performed on both X wagons (MY100DX). It measures the following characteristics of the vacuum system:

– *Maximum vacuum* on page 10-9.

– *Flow at medium vacuum* on page 10-10.

– *Pressure at medium flow* on page 10-10.

– *Pressure at minimum flow* on page 10-11.

– *Filter flow Midas* on page 10-11.

– *Filter flow HYDRA* on page 10-11.

Maximum vacuum

This test will measure the maximum vacuum level. The state of the Midas valve is set to **vacuum on**, see red circle in Figure 10-7. This will enable that no air will leak in, hence maximum vacuum will be achieved.

– Limit for passing this test is -70kPa.

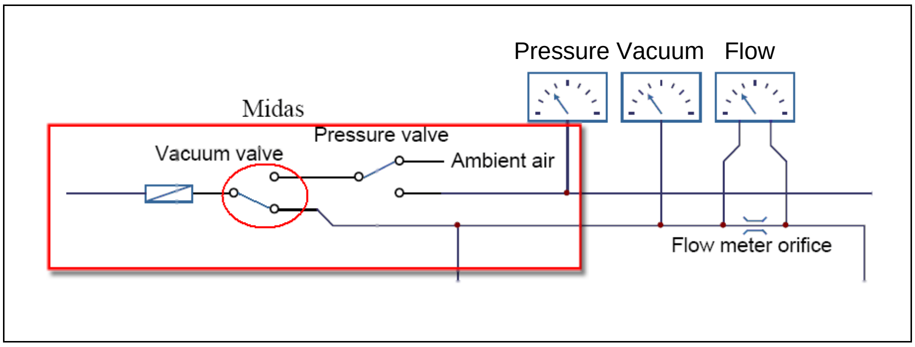


Figure 10-7. Maximum vacuum.

Flow at medium vacuum

This test measures the air flow when medium vacuum is applied. This means that the Midas vacuum valve is set to **vacuum on**, see Figure 10-8, and therefore sucks air through the Midas tool. This situation simulates the vacuum and airflow when picking MELF components.

– Airflow must exceed 6 l/min to pass this test.

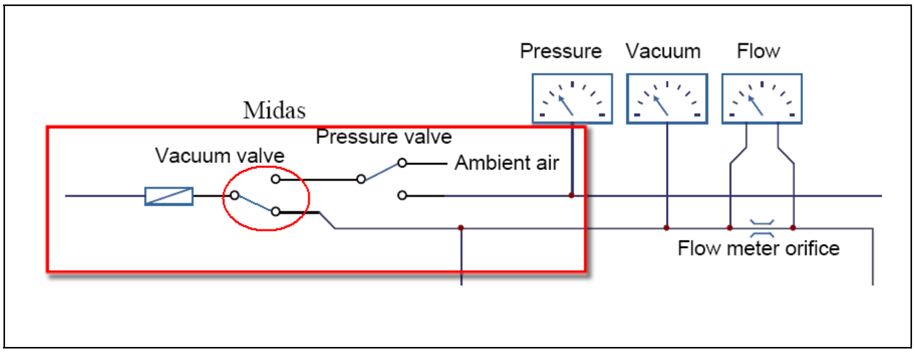


Figure 10-8. Flow at medium vacuum.

Pressure at medium flow

This measurement tests the pressure when there is a medium air flow through the system. This is achieved as in the flow at medium vacuum measurement, by having the Midas vacuum valve set to **vacuum on** and the **air pressure** is **on**. See Figure 10-9.

– The pressure must be between 25 kPa and 35 kPa to pass this test.

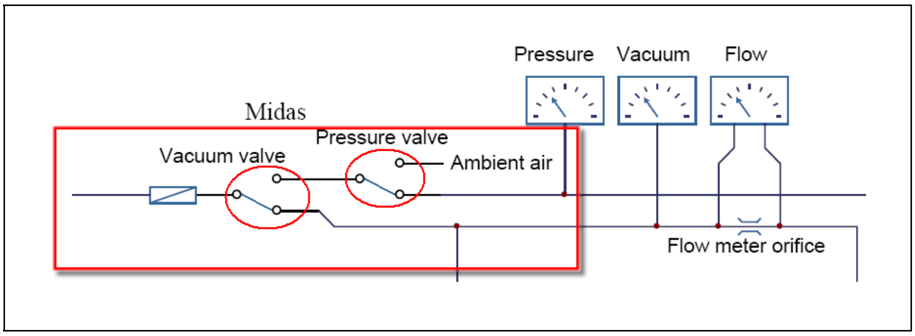


Figure 10-9. Pressure at medium flow.

Pressure at minimum flow

This measurement resembles the previous test (*Pressure at medium flow*). The difference is that during this test maximum vacuum is achieved by setting Midas vacuum valve to **vacuum off**. See Figure 10-10.

– The pressure must be between 25 kPa and 35 kPa to pass this test.

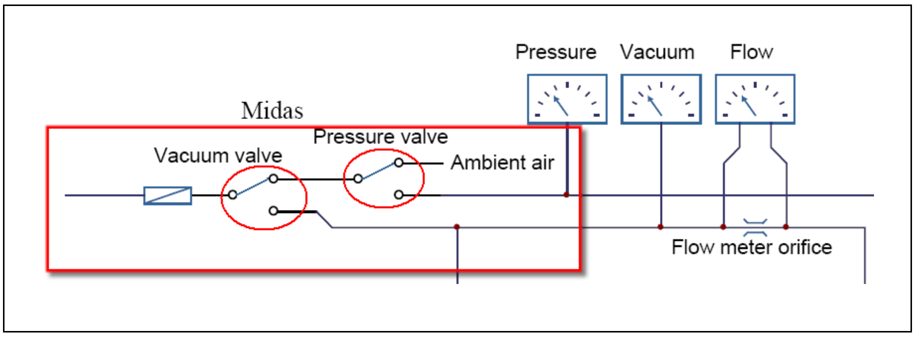


Figure 10-10. Pressure at minimum flow.

Filter flow Midas

This test measures the condition of the Midas filter. The Midas vacuum valve is set to **vacuum on** to enable airflow through the filter, see Figure 10-11.

– Airflow must exceed 6 l/min to pass this test.

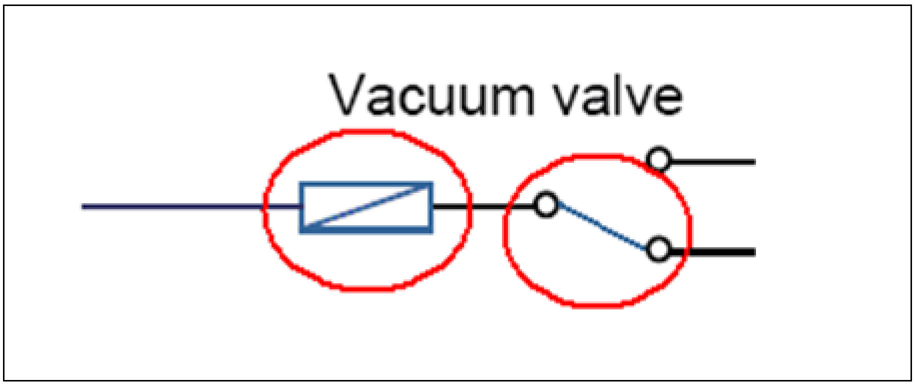


Figure 10-11. Filter flow Midas.

Filter flow HYDRA

This test measures the condition of the HYDRA filters. The test sequence measures each of the filters one by one. The HYDRA filter currently tested is encircled in the Figure 10-12. The HYDRA vacuum valve is set to **vacuum on**.

– Airflow must exceed 2 l/min to pass this test.

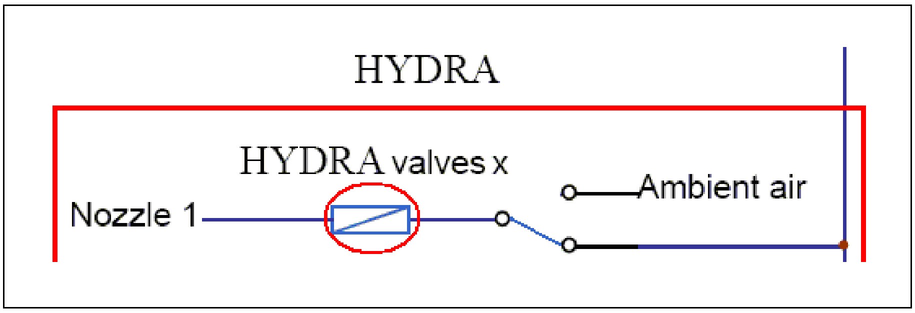


Figure 10-12. Filter flow HYDRA.

Extensive Diagnostic Test

The extensive test sequence augments the automatic test sequence. It also requires assistance from the operator. The operator has the option to run this test on the right X wagon or the left X wagon (MY100DX). The extensive test sequences are described below.

Valve Time Measurements

This test measures the response time of the Midas and HYDRA valves. There are two types of tests on the valves, valve on time and valve off time.

Midas Valve Tests

– Valve on time

This test measures the time it takes for the flow to reach medium level after the Midas vacuum valve has gone from **vacuum off** (minimum flow), to **vacuum on** (maximum flow).

The valve on time measurement for Midas succeeds if the time is between 1 and 18 ms.

– Valve off time

This test measures the time it takes for the airflow to reach medium level after the Midas vacuum valve has gone from **vacuum on** to **vacuum off**.

The valve off time measurement succeeds if the time is between 1 and 9 ms.

HYDRA Valves Tests

The HYDRA tests are done analogically for one HYDRA pipette at a time.

For HYDRA the limits for **valve on time** are 1 ms and 9 ms and for **valve off time** 1ms and 5 ms.

Leak diagnostics

This test aims at measuring if there is any leakage in the system.The shut-off valve should be closed during the system leakage test.

This test requires operator assistance.

1. When prompted by TPSys, turn off the shut-off valve, see Figure 16.

   The shut-off valve is accessible from the inside of the electric shelf compartment, the valve is located behind the lower right front cover of the machine. The lower left front cover has to be removed before the lower right cover can be removed.

   The pump will be turned on and start reducing the air still present in the system.

2. The shut-off valve should be closed until the test is completed.

   When the system has stabilized it will measure the time passed until the system has been refilled with air through leaks.

   The longer it takes to fill the system with air, the less leakages the system has.

   – The time required to fill the system with air must exceed 60s to pass this test.

3. When prompted by TPSys, turn on the shut-off valve again.

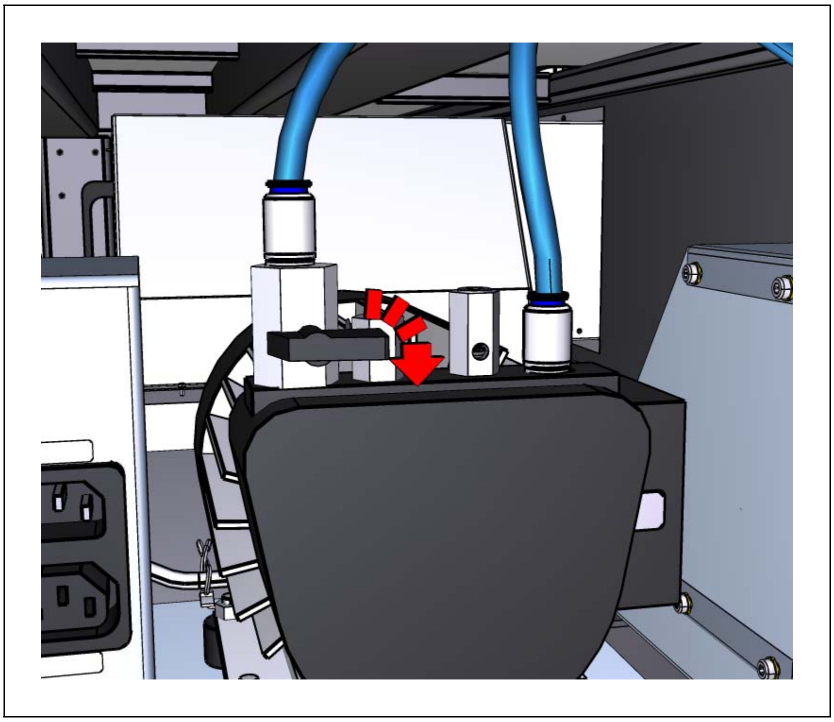


Figure 10-13. Shut-off valve.

Results

After completion the result is presented together with test values and test limits. The results are organized according to X wagon and only the tests performed are presented.

Adjustments

This section comprises the following adjustment..

– *Adjusting the Vacuum Pump Pressure* on page 10-14.

Adjusting the Vacuum Pump Pressure

This section describes how to adjust the vacuum pump pressure.

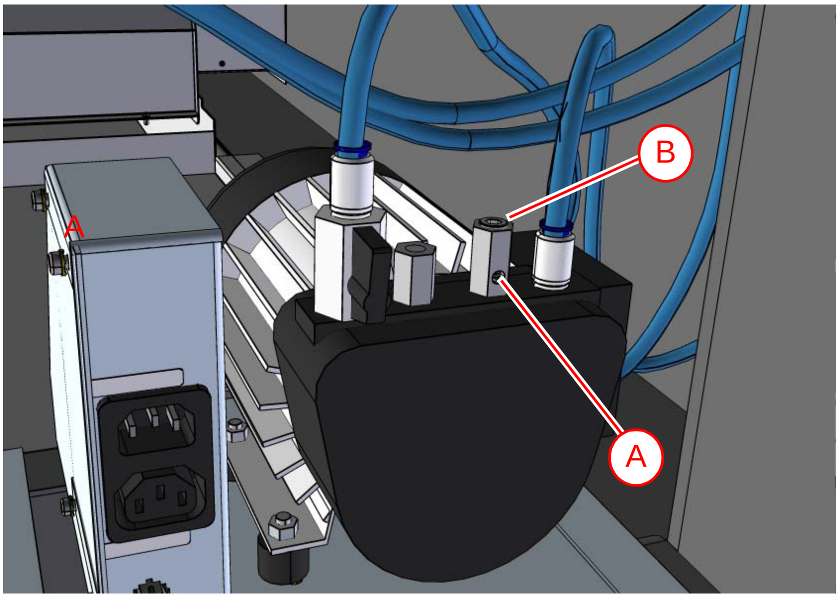


Figure 10-14. Adjusting the vacuum pump pressure.

1. Loosen the locking screw ('A' in Figure 10-14) somewhat.
2. Insert an Allen key into the casing ('B') and very carefully adjust the vacuum pump pressure.
3. When satisfied, tighten the set screw.

11. Power Supply and Electronic System

This chapter contains information about all electrical units and their fuses that are located on the electronic shelf inside the machine.

Electronic units that is not located on the electronic shelf are not covered by this chapter, but information regarding these units can be found in their respective chapter in this manual.

The following units are described in this chapter. All the units are located on the electric shelf:

- *PIU (Power Inlet Unit)* on page 11-4.
- *CB3 (Computer Box 3)* on page 11-5.
- *XBOX* on page 11-7.
- *TCFS (Temperature Controlled Fan Speed)* on page 11-9.
- *Battery Support* on page 11-10.
- *PS5 (Power Supply 5)* on page 11-11.
- *EPT3 (Auto Transformer 3)* on page 11-12.
- *CB3 (Computer Box 3)* on page 11-5.

WARNING! These units contain dangerous voltage levels. Follow the safety instructions in the operator´s manual. Power must be switched off before opening a unit.

Fuses

The electrical systems are protected by fuses located in the following units:

- *PIU (Power Inlet Unit)*.
- *XBOX*.
- *EPT3 (Auto Transformer 3)*.
- *PS5 (Power Supply 5)*.
- *TCFS (Temperature Controlled Fan Speed)*.

System Description

The MY100 machine utilizes a system of distributed electronics, this means that the control of each unit in the machine has its own control electronics included in the unit. Each unit has its own CMOT board.

The electronic shelf is located behind the two front covers on the machine.

The figure below describes the name and location of the electrical units located on the electronic shelf.

- Main Power Switch ('A' in Figure 11-1).
- Power Inlet Unit ('B').
- CB3 (Computer Box 3) ('C').
- XBOX ('D')
- TCFS (Temperature Controlled Fan Speed) ('E').
- Backup Batteries ('F').
- PS5 (Power Supply 5) ('G').
- EPT3 (Auto Transformer 3) ('H').

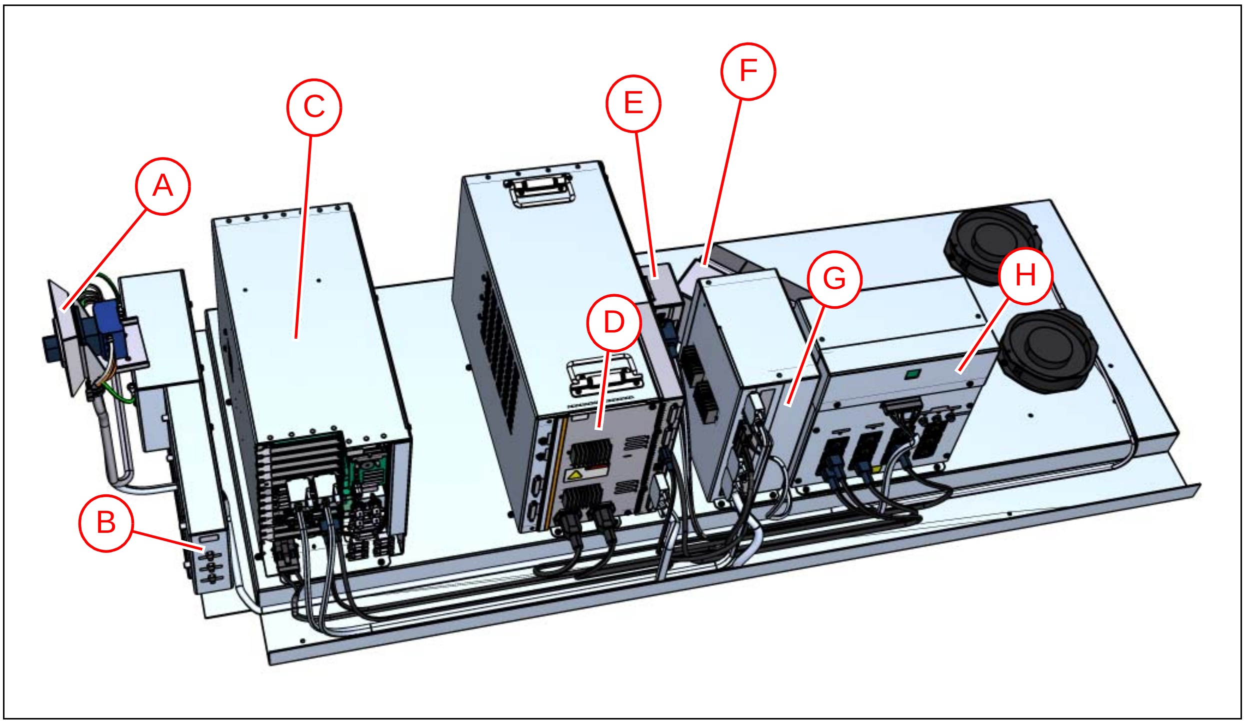
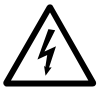


Figure 11-1. Electronic Shelf.

Schematics

All schematics regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Main Power Switch



DANGER! The main switch is always fed with power, even if the machine is powered off. Always disconnect the power cord from the mains before performing any service to this unit. Only authorized service personnel are allowed to commence any servicing within this unit.

The general purpose of the main power switch is to connect and disconnect the machine from the incoming power mains.

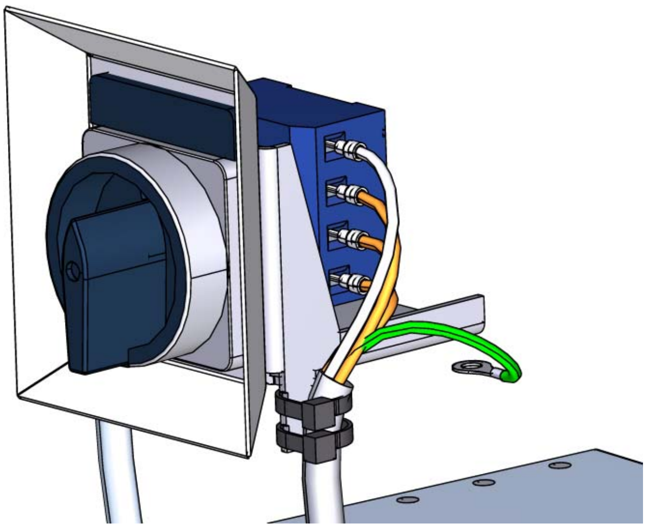


Figure 11-2. Main Power Switch.

PIU (Power Inlet Unit)

*DANGER! The main switch is always fed with power, even if the machine is powered off. **Always** disconnect the power cord from the mains before performing any service to this unit. **Only authorized** service personnel are allowed to commence any servicing within this unit.*

The PIU (Power Inlet Unit) is located behind the left front cover on the left side wall. The incoming mains is first connected to the power inlet unit and from there the power is routed via the main switch and then to the EPT3 unit (see section *EPT3 (Auto Transformer 3)* on page 11-12) and there converted to 230VAC that supplies the various machine systems with power.

The voltage and Y or Delta selection is done by installing an XNET2 plug in the EPT3 unit. For detailed instructions see Chapter 2 *Installation*.

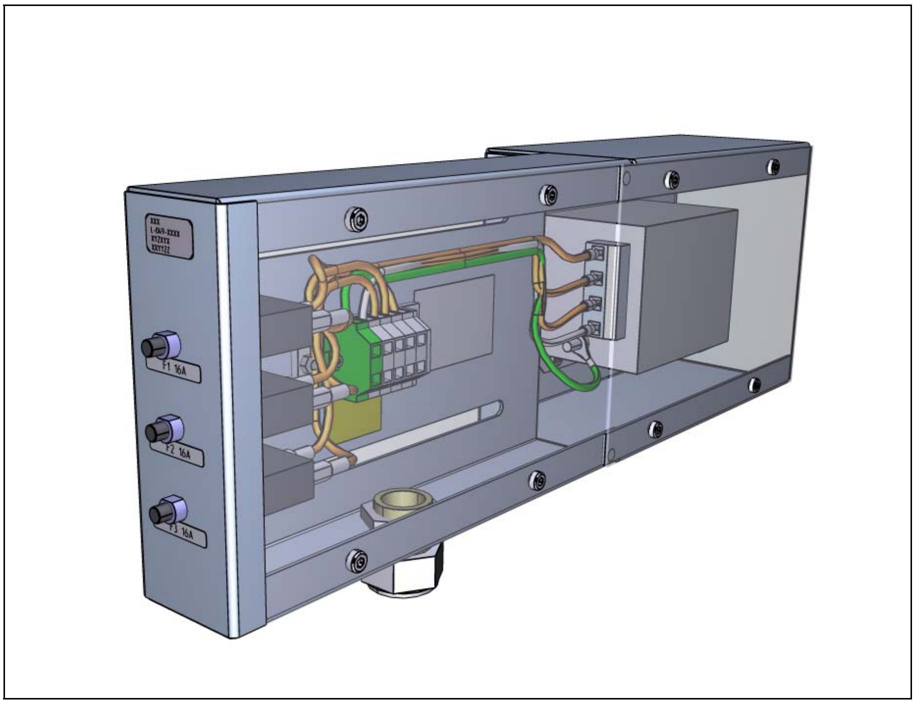


Figure 11-3. Power Inlet Unit
(For visual clarity, the access covers has been made transparent).

The PIU contains three automatic fuses F1, F2 and F3. The fuses are rated 16 A Slow and they are all located at the front of the unit, see Figure 11-3.

CB3 (Computer Box 3)

The computer system is located in the Computer Box 3 (CB3). The CPU and the CAN-board that controls the machine are located in this box. Also there are boards controlling the different cameras in the machine.

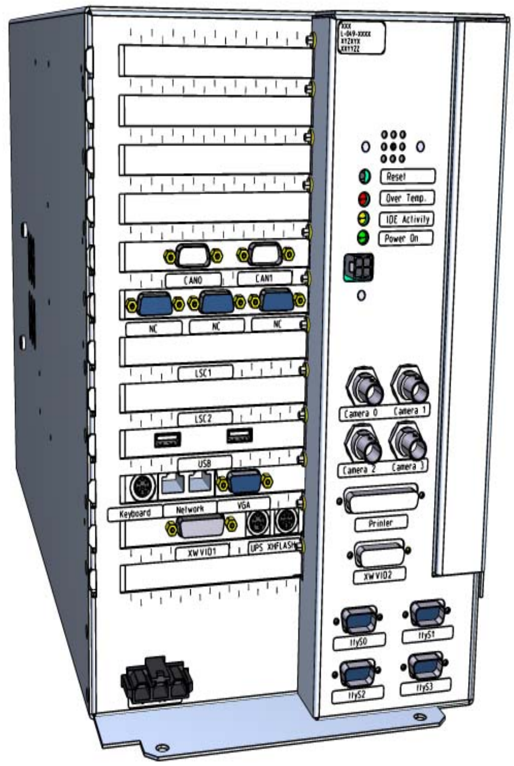


Figure 11-4. Computer Box 3.

The CB3 consists of the following parts:

- CPU board with RAM memory.
- ATX Power Supply, an internal 24V power supply unit for the CPU.
- Two hard drives for the software.
- DVD and floppy disc drive integrated in the CB3 box.
- USB ports and network are included on the CPU card.
- VVG2 (Video and VGA Board 2) The VVG2 board is a frame grabber. It handles video information from analog and digital cameras. The information is stored in a local memory that can be accessed from the PCI bus, or the information can be displayed on the monitor.
- The VVG2 board handles all cameras and video signals. Up to seven cameras can be connected to the machine, X-wagon camera, two Linescan cameras and four more.

- The MY100 can be equipped with none, one or two LSAD (Linescan Camera A/D-converter) that control the Linescan cameras in the machine.
- The LSAD boards are part of the linescan camera system and handles the following functions Analog video reception, A/D-conversion, Look-up-tables, Linear encoder counter, Line-sync generation and LED control. LSAD (Line Scan Camera A/D-converter Board). Refer to Chapter 9 *Vision Systems* for more information regarding the LSAD boards.
- CAN (Controlled Area Network) board for the CAN system in the machine.

CP6 (Central Processor 6)

The CP6 (Central Processor 6) is an ISA board in the CB3 box that provide the following features:

- Eight RS232 communication channels, four external serial ports and four internal (three of the channels are not used).
- Connection to the XMB (X Module Board) to get the XHFLASH signal from the Linescan and HYDRA camera(s). The XMB also receives the encoder signal from the read head on the X wagon. This signal is necessary to determine the X wagon's exact position.
- Connection to the XFCB (X Frame Connector Board) to control the signal tower. Refer to Chapter 5 *Mount Head Movement System* for more information about the XFCB.
- Connection to the XFCB (X Frame Connector Board) to control the illumination for the DVC (Dual Vision Cameras) and the HYDRA camera.
- This board also distributes camera synchronization signals and receives the X-wagon camera video signal for the VVG2 board.
- Connection with PS5 that control the battery support and can receive power failure alarms. Refer to section *PS5 (Power Supply 5)* on page 11-11 for more information about the PS5.
- Measures the internal PC voltages and temperatures.

If the BIOS of some reason looses its settings then the BIOS and time settings can be restored by following the instructions in document P-019-0001c.

XBOX

The general purpose of the XBOX is to generate and amplify the high power that is needed to run the X wagon(s) at very high speeds.

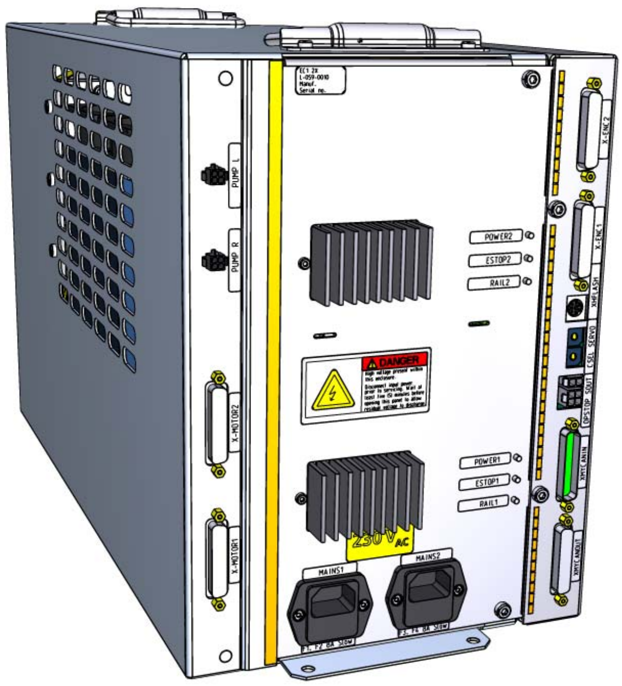


Figure 11-5. XBOX 2X unit.

The description of the XBOX 2X unit below refers to a machine with two X wagons (MY100DX), therefore most units are doubled. The XBOX for a machine with single X wagon is called XBOX 1X.

The XBOX 2X consists of the following main parts:

- Two big transformers that convert the incoming 230 VAC power that is produced in the EPT3 box.
- Two very large capacitors that are used to accelerate the X wagons to very high speeds. The energy that is produced when the X wagons are braking is also used to recharge the capacitors.
- Two power amplifiers, one for each X wagon. The power amplifiers are exactly the same as the model used in the Y module. This means that the power amplifier can be used in the X box or vice versa. If a power amplifier from the Y module is installed in the X box then the servo will configure the power amplifier to be used for the X wagon movement. This procedure will last about one minute, then the new power amplifier is ready to use.
- The XMB (X Module Board) uses the C-MOT (Can Motor controller) to control the XBOX and the X-wagon motors. The XMB communicates with the power amplifiers via the amplifier's RS232 interface. The XMB also receives the encoder signal from the read head on the X wagon. This signal is necessary to determine the X wagon's exact position.

- Two XMPB (X Module Power Board). The XMPB boards are used to create the 390 VDC that is needed to run the X wagons.
- Two E-stop relays. The relays are used to disconnect the 230 AC power if any of the safety switches is activated. Disconnecting the 230 AC power will stop both X wagons immediately
- The XENC 1 and XENC 2 connectors receive the encoder signals, ATA (Active Thermal Adaption) system signals, beam temperature, fan and stop signals.
- The signals to the PUMP1 and PUMP2 connectors controls the pumps in the vacuum system.

For the computer to be able to communicate with each unit in the machine the unit must have its own address. The address for a particular unit is determined with a control called CSEL (City Select).

The CSEL code for the XBOX 1X and SERVO should be set to '1'.

The CSEL code for the XBOX 2X and SERVO should be set to '2'.

The power from the EPT3 box to the X motor is routed as follows:

EPT3 230VAC > XBOX safety relays > XBOX transformers XBOX XMPB > XBOX capacitors > XBOX power amplifiers > X motor.

The F1, F2, F3 and F4 fuse data are indicated in the following table. XBOX 1X only has two fuses F1 and F2.

The fuses are located inside the power output sockets at the bottom front of the unit see Figure 11-5.

Fuse	Type	Rate
F1	5.0 x 20 mm	8 A Slow
F2	5.0 x 20 mm	8 A Slow
F3	5.0 x 20 mm	8 A Slow
F4	5.0 x 20 mm	8 A Slow

TCFS (Temperature Controlled Fan Speed)

The TCFS (Temperature Controlled Fan Speed) units monitor the temperatures and controls the different fans in the machine. There are two TCFS units in the machine, one is located on top of the X beam and the other is located on the electronic shelf.

The purpose of the TCFS located on the X beam is to electrically control the fan speed. The temperature value of the X beam is important when the ATA (Active Thermal Adaption) system needs to compensate for any deviations in the postioning system, that is caused by heat. The temperature sensor is measured and the fans are controlled by the X servo.

The TCFS units are controlled by the board TCFS (Temperature Controlled Fan Speed).

The TCFS on the electronic shelf regulates the fans that provide cooling for the electronics on the shelf.

There is also a fan in the compartment under the keyboard inside the board handling system's front hoods. This fan is controlled by the servo in the Y box. This fan is not related to the TCFS system in any way.

Furthermore there are two small fans mounted on top of the X-wagon's fan holder unit. The purpose of these fans is to exhaust hot air coming from the linear motor on the X wagon. These fans are also controlled by the X servo.

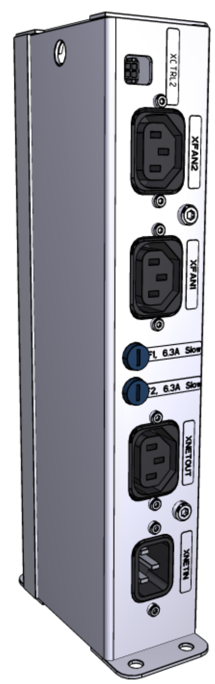


Figure 11-6. Temperature Controlled Fan Speed.

The F1 and F2 fuse data are indicated in the following table. The fuses are located at the front of the unit, see Figure 11-6.

Fuse	Type	Rate
F1	5.0 x 20 mm	6.3 A Slow
F2	5.0 x 20 mm	6.3 A Slow

Battery Support

The battery pack provides battery support +36V to the machine in case of power failure.

The battery pack is located on the electronic shelf, behind the PS5 unit ('6' in Figure 11-1).

If the main power fails the PS5 will automatically switch to +36V battery power and send a power fail signal to the CP6. The CP6 will generate an interrupt in the PC which notifies TPSys to shut itself and the Linux system down in a safe manner. At the very end of the shutdown sequence the software will send a signal via CP6 to the PS5 that shuts down the PS5 unit.

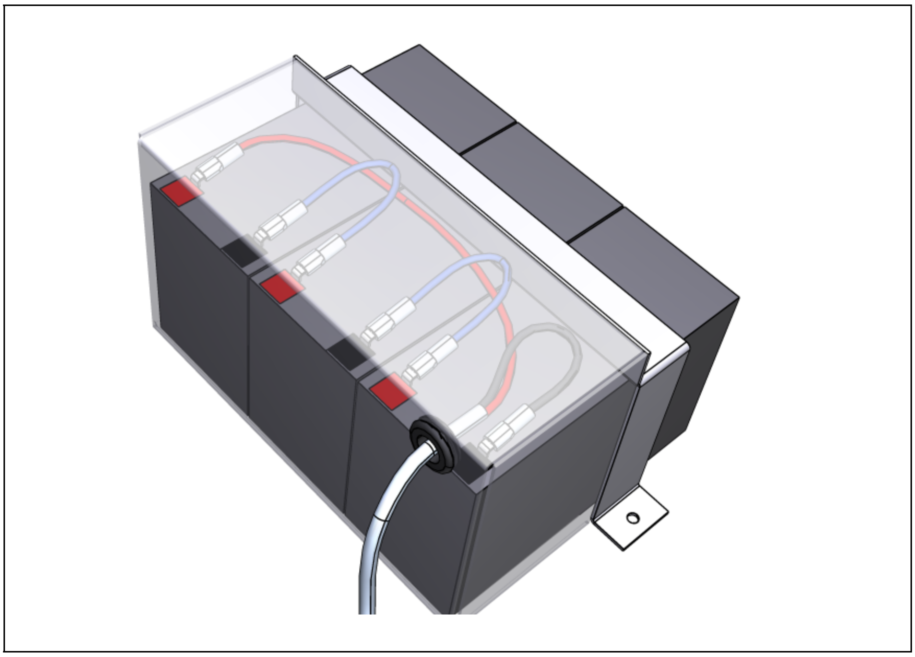


Figure 11-7. Battery support.

If the machine for any reason is turned off from power for more than 6 months the batteries should be charged for 24 hours to prevent backup failure. The machine automatically charges the batteries as long as the machine is turned on.

The batteries should be changed after 5 years to new batteries.

CAUTION! Risk of injury by improper handling!
Do not attempt to reactivate low batteries by heating or other methods (risk of explosion and cauterization).
Do not throw batteries into open flames.
Do not dismantle batteries.

PS5 (Power Supply 5)

The PS5 (Power Supply 5) is located on the shelf in the front of the machine. The PS5 is fed with 230 VAC from the EPT3 unit.The PS5 uses the 230 VAC to create the +24 V and +48 V output. The maximum effect that the PS5 can generate is 700 VA in total.

The PS5 has an information panel with green, yellow and red LED's showing the status of the machine. The LED's are interpreted as shown in the following table:

Designation	Color	Function
24V	Green	24V supply OK
48V	Green	48V supply OK
ERR	Red	Over-current or Over temperature
BAT	Yellow	Machine is running on battery support

The PS5 unit also acts as a central hub for the CAN network and safety signals.

Finally, the unit also redirects battery power to the CB3 unit in case of power failure.

This unit will automatically shut down in case of overheating.

Figure 11-8. PS5 unit.

The F1 and F2 fuse data are indicated in the following table. The fuses are located at the front of the unit, see Figure 11-8.

Fuse	Type	Rate
F1	5.0 x 20 mm	4 A Slow
F2	5.0 x 20 mm	4 A Slow

EPT3 (Auto Transformer 3)

The EPT3 (Auto Transformer 3) units main purpose is to configure the machine for different voltages. The machine can be configured to use between 200 to 250 V in 10 V increments, and may be connected in a Delta or Y (wye) configuration. The machine accepts 50 to 60 Hz mains frequency.

If the machine is configured in a Delta configuration and a phase is missing, the green LED in the front will still light up but with a faint glow. Always measure the voltage to be sure.

The voltage and Y or Delta selection is done by installing a XNET2 plug in the EPT3 unit. For detailed instructions on configuring the machine for different voltages see Chapter 2 *Installation*.

The unit is also a connector board for the power transformers. It has 12 IEC-320 power outputs which is used to supply power to different systems in the machine.

The unit also has a connector for an optional internal fan and three isolated power outlets, dedicated for Linescan camera power and monitor power.

Both the 24V and 48V power is regulated, which means that the voltages are not affected if the incoming power is fluctuating.

Figure 11-9. EPT3 Unit.

The F1, F2 and F3 fuse data are indicated in the following table. The fuses are located at the front of the unit see Figure 11-9.

Fuse	Type	Rate
F1	5.0 x 20 mm	1 A Slow
F2	5.0 x 20 mm	1 A Slow
F3	5.0 x 20 mm	1 A Slow

Functional Test

The following functional tests are possible to perform on the *Power Supply and Electronic System*.

– *Monitoring the State of the Hard Disks* on page 11-13.

Monitoring the State of the Hard Disks

The system monitors the hard disks automatically. If a hard disk fails, the following message will be displayed in the *TPSys Messages* window.

MMI-6: Raid disk <disk> failed.

It is then important to replace the failed hard disk as soon as possible, contact MYDATA support to have the hard disk replaced.

It is possible to monitor the hard disk status in the TPSys service program. Select *Utility* > *Harddisk Status* to open the *Harddisk Status* window.

The status column in the Harddisk status window can contain one of the following values:

Ok
: Disk is ok.

Faulty
: Disk is present but not working.

Missing
: Disk is missing (the logical RAID partition).

Rebuilding
: Disk is present and being updated.

12. Board Handling System

This chapter describes the board handling system. It contains brief descriptions about internal and external conveyors, Y module and different conveyor configuration systems.

This chapter also contains instructions concerning measurement and adjustment procedures that can be performed on the board handling system configurations.

The board handling system comprises the following main parts:

Y module

The Y module unit provides the Y movement of the manual load table or the internal Conveyor in the machine.

Conveyor system

To transport the mounted PCB, the Y module is equipped with an Internal Conveyor.

Cover hoods

The Y module and Conveyor system are covered by hoods to protect operators from moving parts of the machine.

YM (Y Module)

YM (Y Module) is the new generation of Y wagon, used with the T-series conveyors. YM fits on MY series of machines and the MY100. With YM, CAN (Controlled Area Network) is introduced to control the hardware.

System description

YM is mounted in the machine using guide pins, the YM is mounted in a back position to reach the external conveyor.

YM must be always placed in the middle of the machine (X direction).

The YM design is robust and very stable. It has a very firm connection between the encoder head and the position of the YM. This gives the servo excellent control of the YM.

The chassis hold the linear scale ('A' in Figure 12-1), linear guides and the crash protection angles ('E'). A typical servo error during movement is not larger than 20 microns.

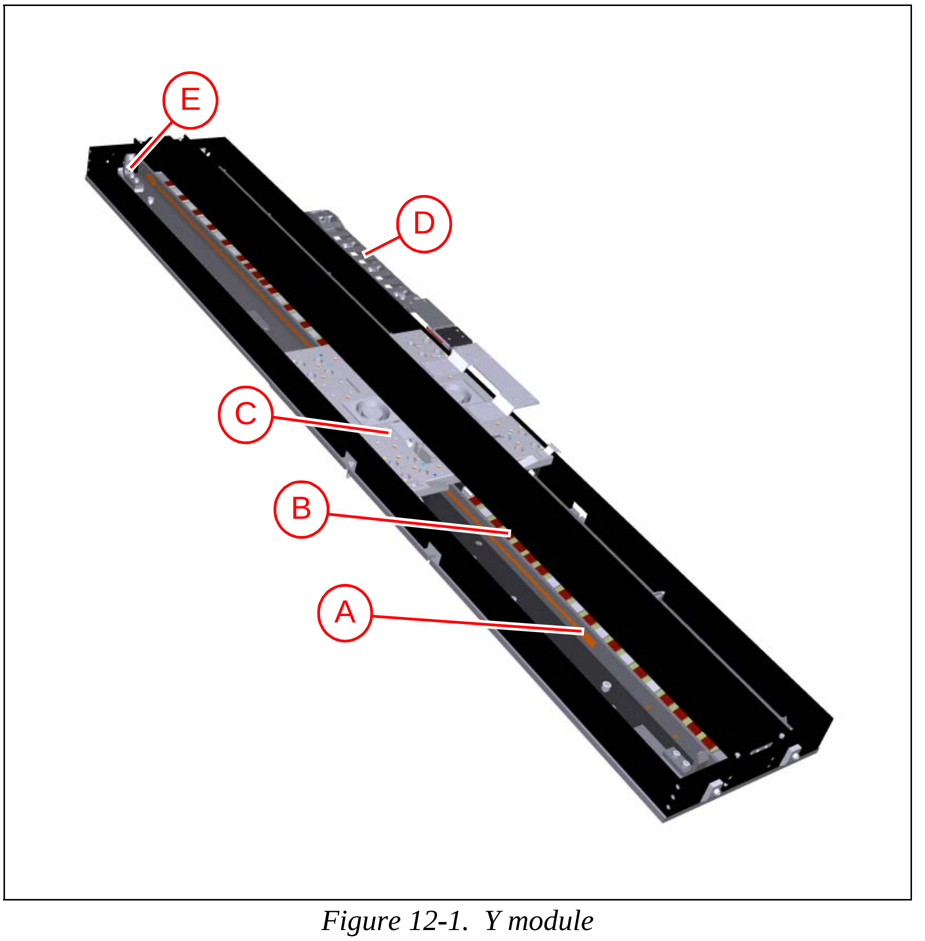


Figure 12-1. Y module

Linear motor

The YM has a linear motor. The motor is divided into two parts, the coil on the sliding part and the magnets ('B' in Figure 12-1) on the YM base.

YM is controlled by C-MOT (Can Motor controller) and not a MOT board as on earlier Y units.

The Y position encoder also has two parts, the read-head and the sliding plate of ('C') and the scale on the YM base.

The YM base and slide is designed to keep the necessary 0.8 +/- 0.1 mm gap between the encoder and scale along the length of the YM unit. Both scale and encoder head is replaceable.

The force of the motor is strong enough to accelerate a 54kg load to 0.7G with excellent control. Smaller loads are possible to accelerate up to 2G. The speed is limited by the encoder to 2.5m/s with the 0.5 micron resolution.This means that the YM can handle a large range of loads.

The sliding plate is the interface between the YM and the conveyor. It holds the motor and the cooling of the motor. Cooling is done by a heat sink (sheet metal) and two fans.

Electrical System

To ensure easy access to the electronics (YMB, CMOT, relays and YM amplifier the control box YBOX is placed under the YM with a cover that can be removed in the back. It is designed to facilitate when performing service on the electronics. The YBOX is connected to the sliding plate by the cable chain ('D' in Figure 12-1). The chain has a special movement to fit all applications. It is important to align the chain properly at installation.

Schematics

All schematics regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Electric parts

YMB2 (Y Motor Board 2)

- YMB2 (Y Motor Board 2) is the control board for the YM unit. It connects the CMOT board to the amplifier.
- YMB2 has all the necessary encoder inputs, motor drive connections, hood sensors and monitors the linear encoder.
- YMB2 has a ID chip to identify it self for CMOT. This makes it possible to load the correct ALTERA PLD configuration files to the CMOT automatically when TPSys is starting up.
- CMOT, the CMOT needs the YMB2 to make a unit that can run the YM (This combination with CMOT and another board is called backpack).

CSEL (City Select)

For the computer to be able to communicate with each unit in the machine the unit must have its own address. The address for a particular unit is determined with a control called CSEL (City Select).

- The CSEL code for the Y module should be set to '1'.

Power supply

The YMB2 is fed via XMYCAN. It is a mixed power D-sub, the three power pins carries the voltage supply, 48V, 24V and GND from MCCB. The 24V is used to generate specific voltages needed on the board. YMB has two MYCAN connectors, one of each gender, to daisy chain to other upcoming devices. The last device in the chain must have a termination plug.

The YM amplifier is fed with 230 VAC from the EPT3 unit.

Adjustments

This section describes how to measure the friction on the Y wagon.

Measure Friction On Y Module

This procedure describes how to measure friction on the CAN controlled Y wagon. The maximum and minimum position values for the Y wagon will be needed to be able to perform this measurement.

1. Start the *Service Program* by selecting *Exit* > *Exit To Service* in the TPSys menu.
2. Select *Motor* > *Y motor* > *Read range.*
3. Make a note of the position values that are shown in the information box.
4. Select *Motor* > *Y motor* > *Measure friction.*
5. Enter the speed value 100 mm/s in the dialog box.
6. Select the field *Measure friction* and press <Enter> to start the measurement.
7. When the measurement is done, select the field *View result* and press <Enter>.
8. Repeat the procedure above, using the following speed values 200, 400 and 600 mm/s.

Internal Conveyor (T-Series)

The main function of the conveyor system is to transport the mounted PCB to the next stop, usually an external conveyor.

The MY100 machine type can be configured with the T3, T4, T5 or T6 internal conveyor system. The difference between these systems is the width, which affects the board size to be assembled. The names of these systems reflect the unit width. The T3 type occupies three magazine positions and the T4 type four magazine positions and so on.

The tables below describe which magazine slots that respective conveyor occupies in the two different machine sizes. Note that it is not possible to mount the T5 or T6 conveyor system on the MY100-10 machine.

MY100 - 14

	Slots													
Conveyor	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
T3	1	2	3	4	Conveyor			8	9	A	B	C	D	E
T4	1	2	3	Conveyor				8	9	A	B	C	D	E
T5						Conveyor					B	C	D	E
T6					Conveyor						B	C	D	E

MY100 - 10

	Slots									
Conveyor	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
T3	1	2	3	4	Conveyor			8	9	A
T4	1	2	3	Conveyor				8	9	A

System Description

The T-series of conveyors uses a new clamping technology and is very robust in its design. This conveyor can only be used with the YM unit. The conveyor uses the CAN system via the YMB2.

The T-series conveyor can handle many shape or size boards, from thin panels to big and heavy boards.

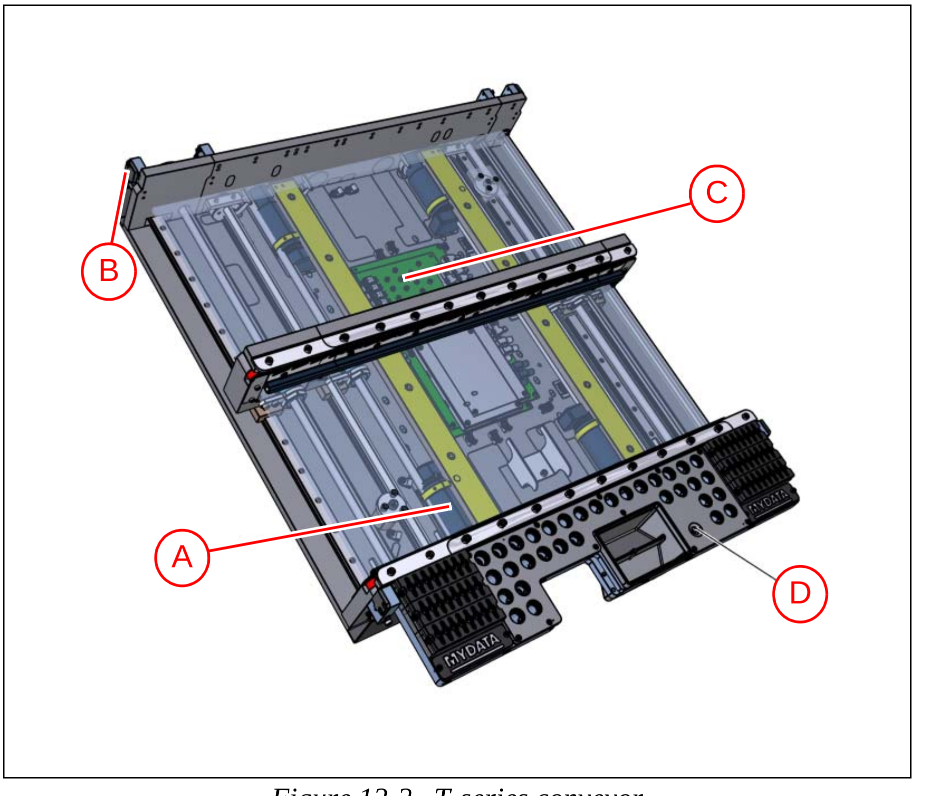


Figure 12-2. T-series conveyor
For visual clarity, the load table covers has been made transparent.

Max component height is 15 mm as standard but 22 mm with a few modifications. Board edge clearance is 3.2 mm.

The top board edge clearance can be modified by shifting the position of the top rails.The top rails can also be flipped over to make use of the alternative blasted metal friction surface.

The conveyor has a release button ('D' in Figure 12-2) for manual removal of PCB. Two board edge sensors ('B') are used to detect boards.

Conveyor motors

The motors ('A' in Figure 12-2) in the conveyor are the same model in pair, meaning that the two lift motors are the same model and the two motors for transport and width are the same model.

It is not possible to use a lift motor as a transport motor or a width adjustment motor. But it is possible to use a transport motor as a width adjustment motor, but it is not recommended since they are marked differently and the cable length varies and it might be confusing for the next person dealing with the conveyor.

It is very important to connect the motor and the encoder to the same number of the connector as the motor will break if the encoder is connected to the wrong number (motor will spin but no reading on the encoder which will cause the amplifier to supply more and more current to the motor).

Technical Specifications

	T3	T4	T5	T6
PCB Size (max)	443 x 508	575 x 508	736 x 609	914 x 609
PCB thickness (max)	6 mm	6 mm	12.5 mm	12.5 mm
PCB thickness (min.)	0.4 mm	0.4 mm	0.8 mm	0.8 mm
Board edge clearance	3.2 mm	3.2 mm	3.2 mm	3.2 mm
Magazine slots	3	4	5	6
Camera positions	1	2	2	2

Manual board loading

There are adaptors for manual loading. The adapter can be used for example when building prototypes.

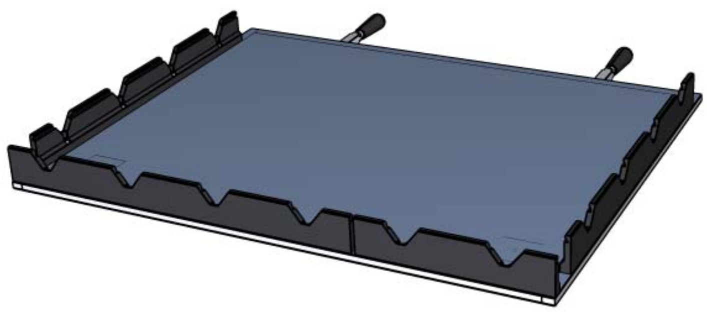


Figure 12-3. Manual load adapter.

Electrical System

Schematics

All schematics regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Electric parts

CB (Conveyor Board)

- CB (Conveyor Board) ('C' in Figure 12-2) is the board that holds the connectors, motor drive, and signal conditioning required to control the four conveyor motors, two board detection sensors and the release button. The CMOT board is attached on top of CB.
- The CAN signal passes the YMB2 board on the way to the conveyor, all signal pass through the Y-cable chain. The signals are routed to the correct functions by the three connectors on the YCB board at the sliding end of the Y-cable chain.
- CB provides the necessary internal +5V and +12V.

CSEL (City Select)

For the computer to be able to communicate with each unit in the machine the unit must have its own address. The address for a particular unit is determined with a control called CSEL (City Select).

- The CSEL code for the Internal Conveyor should be set to '0', and also the Servo Sw. should be set to '0'.

Cover Hoods

To protect operators from moving parts of the machine, the Y wagon and Conveyor system are covered by hoods.

System Description

The front and back cover hoods are protected by safety switches ('A' in Figure 12-4) that stop the machine if the hoods are opened during operation.

To prevent failures in the board handling, the rear side covers contain two pairs of Board Jam Sensors ('B').

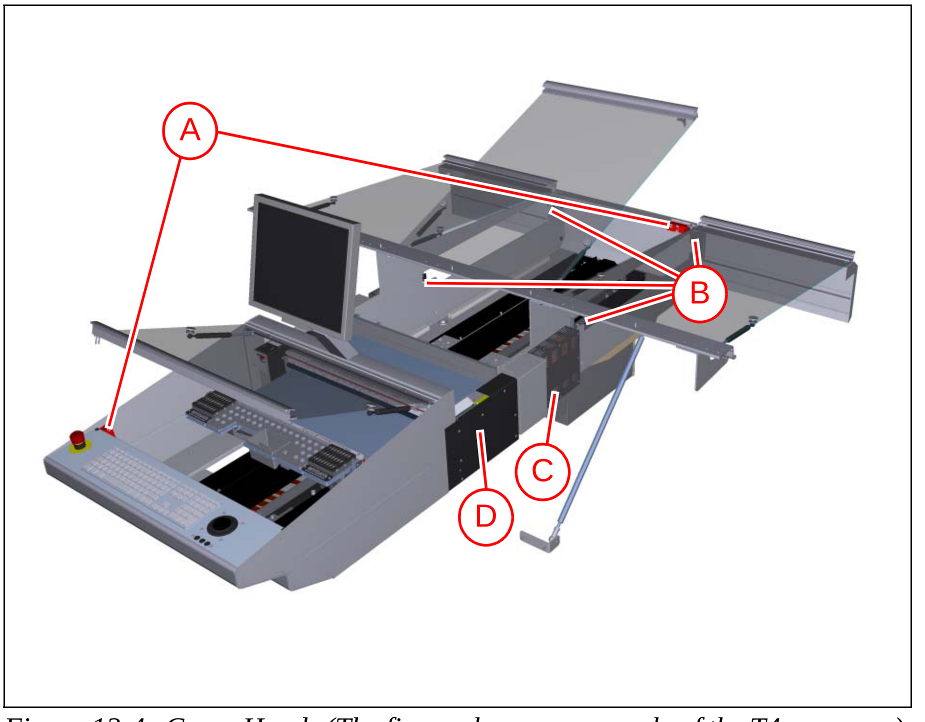


Figure 12-4. Cover Hoods (The figure shows an example of the T4 conveyor).

Camera positions

The covers are designed to integrate the Linescan cameras ('D' in Figure 12-4) and Linescan power supply ('C') into the cover. In the MY100DX machine there are two Linescan cameras mounted inside the front covers.

Adjustments

This section describes how to measure the friction on the T-series board handling system.

Measure Friction On the T-Series Board Handling System

This procedure describes how to measure friction on a CAN controlled conveyor.

1. Start the *Service Program* by selecting *Exit > Exit To Service* in the TPSys menu.
2. Select *Conveyor* > *Width motor* > *Measure friction.*
3. Enter the speed value 10 mm/s in the dialog box.
4. Select the field *Measure friction* in the dialog box and press <Enter> to start the measurement.
5. When the measurement is done, select the field *View result* and press <Enter>.
6. Repeat the procedure above, for the *Transport motor* and the *Lift motor* using the following speed values:
   – *Transport motor*: 40 mNm.
   – *Lift motor*: 1 N.

External Conveyor System

This system consists of external conveyors, board loaders and unloaders that are used to transport the mounted PCB to other stages in the production chain.

Examples of External conveyors are buffer and transport conveyors.There are also loaders, unloaders and workstations available.

The External Conveyor System is not covered by this chapter.

MYDATA does not manufacture the external conveyors inhouse, they are manufactured by the company Electro Design. Depending on country, other brands of conveyors are used with MYDATA machines.

If you want detailed information about Electro Design's Inline system, please visit www.electrodesign.se

Large board solutions

To be able to handle large boards in-line, it is recommended that you use Electro Design's conveyors, then you also get the option of running boardtrains to increase throughput.

13. Component Feeding Systems

This chapter contains descriptions, calibration and adjustment information for the various component handling systems. The chapter is divided into two major sections:

– *Magazine Interface* on page 13-2.
This section describes the MCU (Magazine Controller Unit) and the magazines mechanical interface in the machine.

– *Magazines* on page 13-9.
This section describe the magazine types available to the MY100 machine.

TEX Tray Exchanger is described in a separate manual entitled *TEX Tray Exchanger, Service Manual*.

WARNING! In this chapter, some of the procedures cause the machine to make movements. The below warning must be followed for such procedures. Procedures that cause the machine to make movements are marked with this sign next to the text. Before entering such commands, check the following: Ensure that there are no foreign objects on the assembly table, near the tool bank, or within the X wagon, Y wagon, or Tray Wagon Magazine moving areas, and that the standard tool head and the HYDRA *tools are in their upper positions.*

Magazine Interface

The first part of this section describes the MCU (Magazine Controller Unit). The second part includes a description of the magazines mechanical interface to the magazine slots, and how to adjust the slots.

MCU (Magazine Controller Unit)

Depending on machine model the MY100 is outfitted with one or two MCU (Magazine Controller Unit). The MY100DX is equipped with two MCU's, one MCU on each side of the board handling system. The MCU is used to control the magazines in the machine. All control signals and power are sent to the magazines via the XMYCAN cable.

The MCU's are located in the back of the machine table, behind the magazine slots (see Figure 13-1).

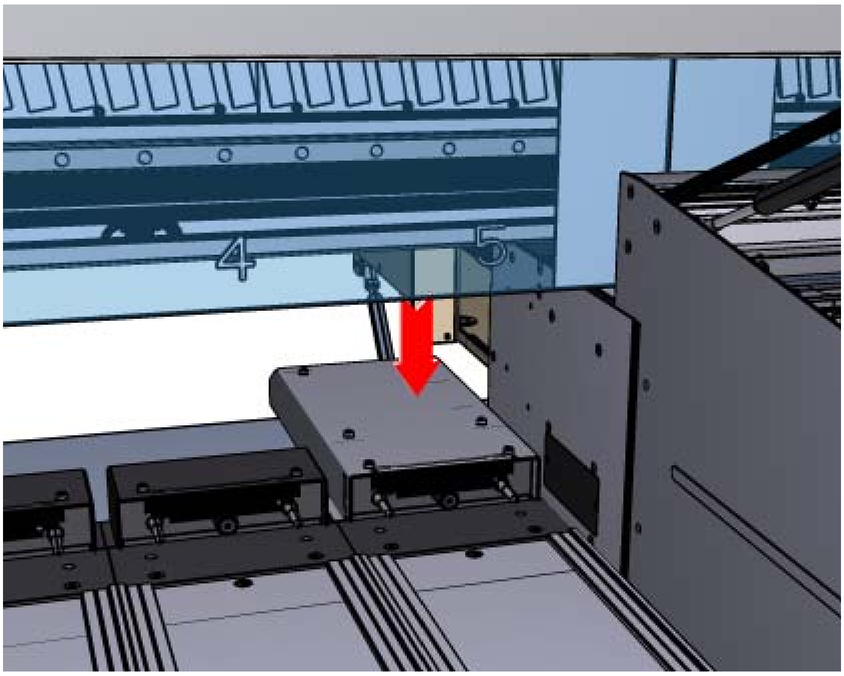


Figure 13-1. MCU (Magazine Controller Unit).

Functional description

When TPSys sends a command (for example feeders to step, step length etc.) through the XMYCAN cable to the MCU, the servo executes the command and sends the signal to the magazines through the MIBB (Magazine Interface Board) and finally to the magazine's control board (in this case TC2, see Figure 13-3) which will activate the motor and perform the command.

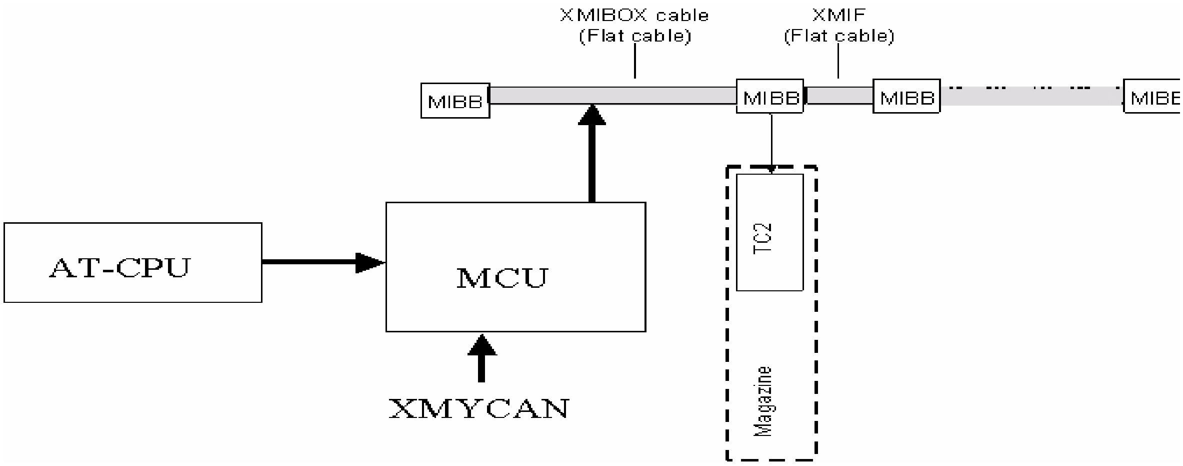


Figure 13-2. Magazine control schematic overview.

Magazine Mechanical Interface

The slot positions in the machine are fixed, the slot plate has two guiding pins ('A' in Figure 13-3) that will guide the magazine to the correct height and X position.

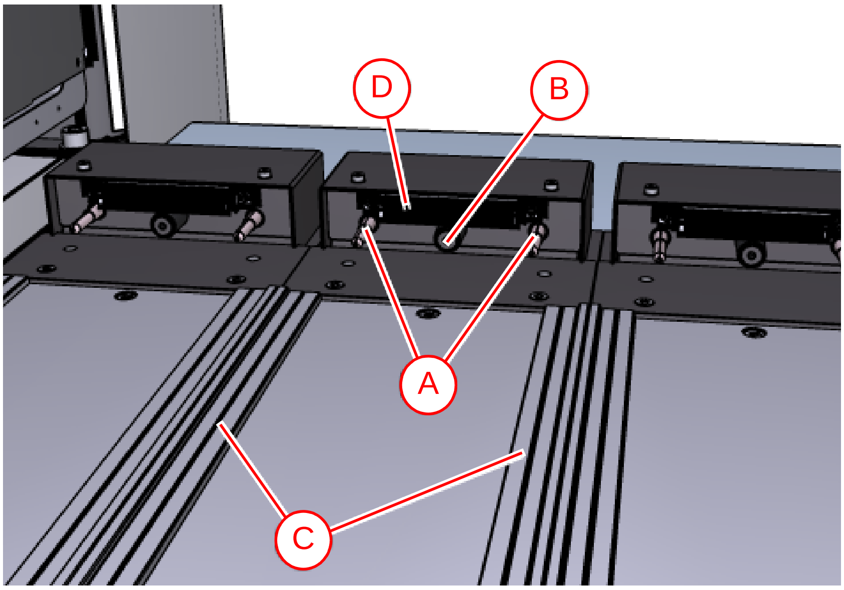


Figure 13-3. Magazine mechanical interface.

The magazine's Y position can only be adjusted using a special reference magazine (available from MYDATA). The Y position is mechanically adjusted with shims by removing the stop screw ('B') and adding or removing shims.

There are also two slide bars ('C') for each slot position. The magazine slides on the these bars when it is inserted into a slot.

The electrical connection to the magazine is made with the connector ('D').

Electrical System

Schematics

All schematics regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Electric Parts

MCB (Magazine controller board)

– The MCB (Magazine controller board) is located inside the MCU (Magazine Controller Unit). The MCB contains additional amplifiers for feeding the magazine motors.

– The MCU is supplied with power and control signals from the XMYCAN cable. The XMYCAN cable is connected to the X-box.

MIBB (Magazine Interface bus board)

– Each slot position in the machine has a MIBB (Magazine Interface bus board), the MIBB is equipped with a coded rotary switch, which is used to set the correct code for this particular slot position.

– The MIBB's are located behind each slot in the machine and they are all connected in a series with a flat conductor cable between each MIBB.

Adjustments

This section comprises the following measurements and adjustments.

– *Setting the MIBB Slot Position* on page 13-6.

– *Adjusting the Slot Position* on page 13-6.

Setting the MIBB Slot Position

The MIBB's (Magazine Interface bus board) ('A' in Figure 13-4) are located behind each slot in the machine and they are all connected in a series with flat conductor cables between each MIBB connector ('C'). Each magazine slot has to have its unique code to be able to be addressed properly by the MCU. On each MIBB (Magazine Interface bus board) there is a coded rotary switch, marked SW1 ('B'). The switch uses the hexadecimal system to code the board, therefore the switch is marked from the digit 0 to the character F.

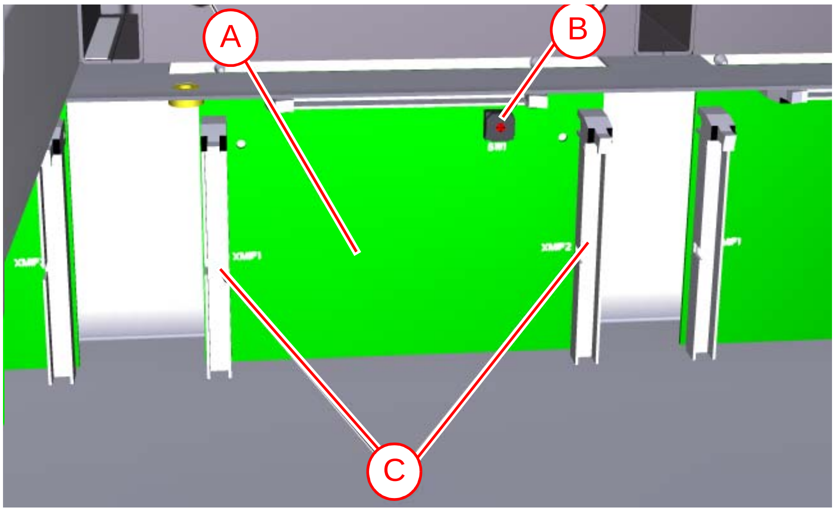


Figure 13-4. MIBB, coded rotary switch.

Each MIBB must have its own unique address. SW1 in each MIBB should be coded as shown in the following tables.

MY100 - 14

	Slots													
Conveyor	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
T3	1	2	3	4	Conveyor			8	9	A	B	C	D	E
T4	1	2	3	Conveyor				8	9	A	B	C	D	E
T5						Conveyor					B	C	D	E
T6					Conveyor						B	C	D	E

MY100 - 10

	Slots									
Conveyor	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
T3	1	2	3	4	Conveyor			8	9	A
T4	1	2	3	Conveyor				8	9	A

Adjusting the Slot Position

This calibration and adjustment sets the offset values measured from the X-wagon zero position to the center of the magazine positions.

To get the full flexibility of the tape magazine system, the machine must be calibrated accurately using a reference magazine.

This adjustment must always be performed if the magazine slot stop screw has been loosened.

Requirements

– A reference magazine is required to adjust and calibrate the magazine slots properly.

If the slot needs to be adjusted in Y direction, then the following tools and parts are also required.

– Shims in different thicknesses.

– A set of metric Allen keys.

Procedure

1. Insert, until stop, the reference magazine in the slot to adjust.
2. Select *Utility* > *Installation and Calibration* > *Locate Slot Position.*
3. Select the magazine position from the shown selection box.

   The X wagon will move to the selected slot.
4. The image shown on the screen represents the camera's crosshairs on top of the reference magazines center line (see Figure 13-5).

   Check the slot's Y direction on the screen against the reference magazine's center mark in both X and Y.

   Use the trackball to move the camera along the horizontal pick position line. The crosshairs should be centered on the line.

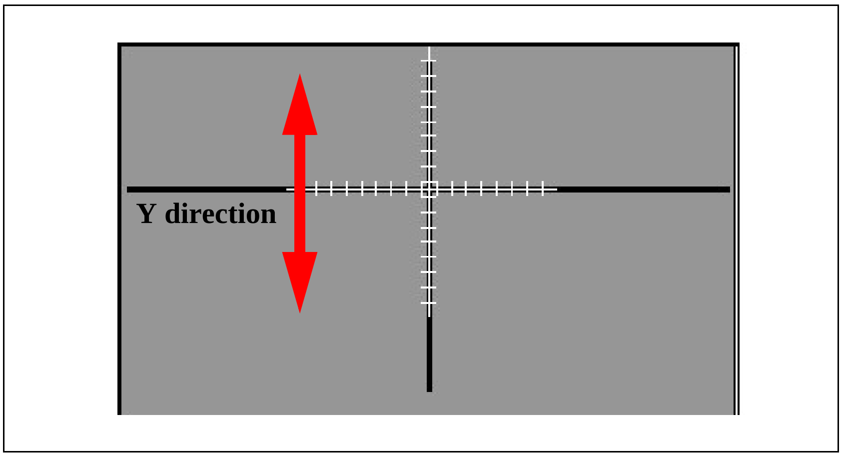


Figure 13-5. Center the crosshairs.

5. If the centermark is off in the Y direction, then the slot position needs to be adjusted as described in the following steps.

6. Start by removing the stop screw ('A' in Figure 13-6) and the distance ('B').

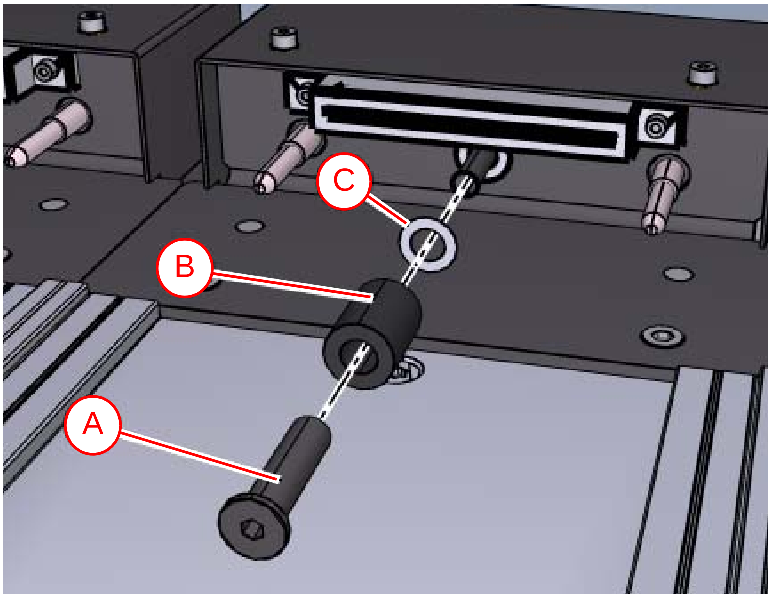


Figure 13-6. Unscrew the Stop Screw.

7. Add or remove shims ('C') as necessary. Shims are available in different thicknesses. Use the crosshair scaling to determine how much off-center the mark is in the Y direction.
8. Check that the Y position of the centermark aligns with the crosshairs.
9. Center the crosshairs on the magazine center mark in the X direction. Confirm by selecting *Ready* in the *Locate position* dialog box.
10. If necessary, repeat the procedure for all the magazine positions.

Magazines

This part of the chapter comprises descriptions of all magazines available to the MY100 machine. The chapter also contains descriptions on how to perform functional tests, adjustments, troubleshooting and repair procedures. The following magazines are described in this manual:

Tape Magazines

– *ALM (Agilis Linear Magazine)* on page 13-10.

– *AM8 (Agilis Magazine 8)* on page 13-16.

– *TM – Tape Magazines* on page 13-24.

Vibratory Magazines

– *ASM (Agilis Stick Magazine)* on page 13-34.

– *VM (Vibratory Magazine)* on page 13-37.

Tray Magazines

– *TWM (Tray Wagon Magazine)* on page 13-40.

ALM (Agilis Linear Magazine)

There are three types of ALM (Agilis Linear Magazine), ALM 8 (for 8 mm tape), ALM 1216 (for 12 and 16 mm tape) and an ALMFLEX that allows mixing feeder units (from 8 to 152 mm tape).

System Description

The main features of these magazines are feeding speed, feeding accuracy and flexible feeding stroke. The magazine can feed tape in variable length. This makes it possible for the software to adjust the pick position for a feeder not only in the X direction but also in the Y direction. For ALMFLEX magazines the feeding features are integrated in the ALMFLEX feeders.

See the *Operator´s Manual* for instructions on how to adjust the pick line.

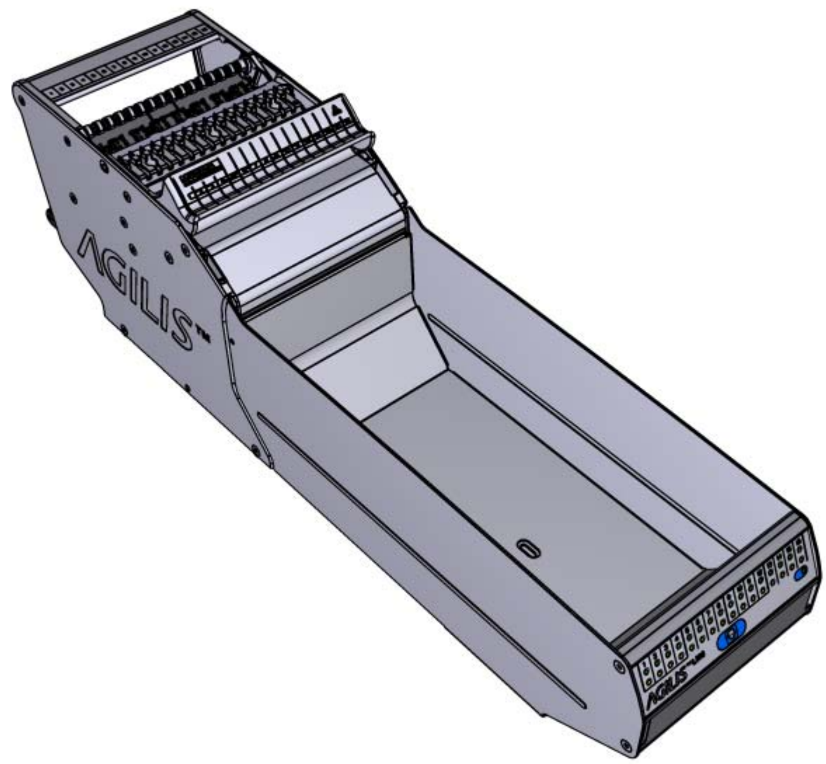


Figure 13-7. Agilis Linear Magazine.

Functional Description

Instead of the cogwheels that feed the tape in for example the AM8 magazine, the ALM magazines have a linear slide that moves back and forth ('A' in Figure 13-8). The slide is equipped with pins ('B') that move up and down. This construction makes it possible to feed tape with steps of arbitrary length.

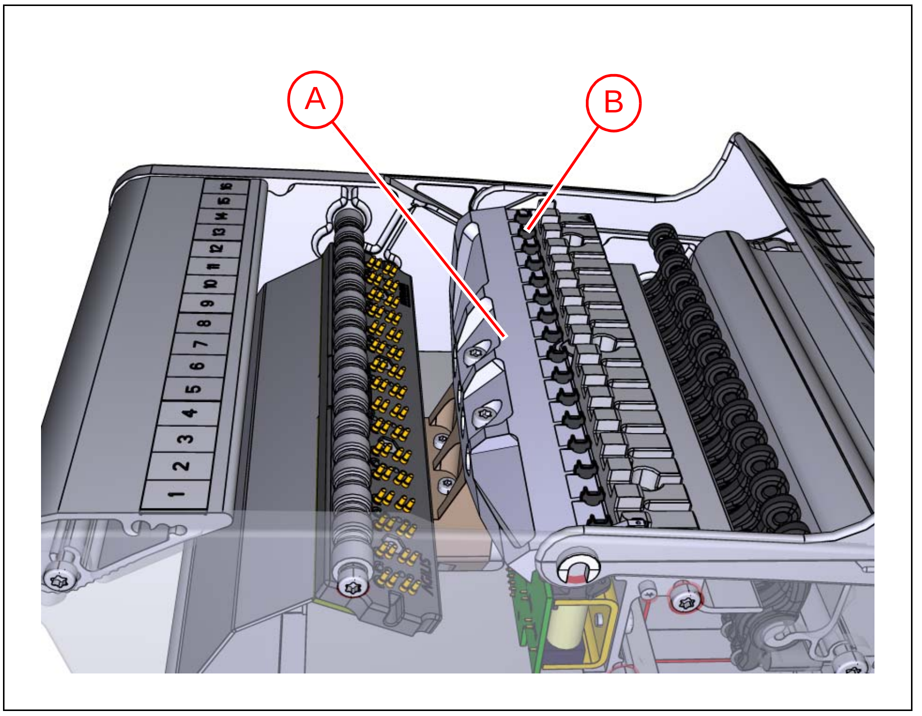


Figure 13-8. Agilis Linear Magazine – ALM8.

The ALMs have two fiducial marks, one on each side of the wagon. They are circular, 1 mm diameter, black on white. Both fiducial marks are searched when the magazine is located. All previous types of magazines only have one fiducial mark (1 mm wide, 10 mm long) on the left side.

Magazine Panel

The Agilis magazine has an information panel with green and yellow LEDs showing the status for each feeder ('A' and 'B' in Figure 13-9). The panel also has a release button ('C') from which you can order the machine not to pick components from the magazine. Finally there is a LED indicating the magazine status ('D)'.

See the *Operator´s Manual* for details.

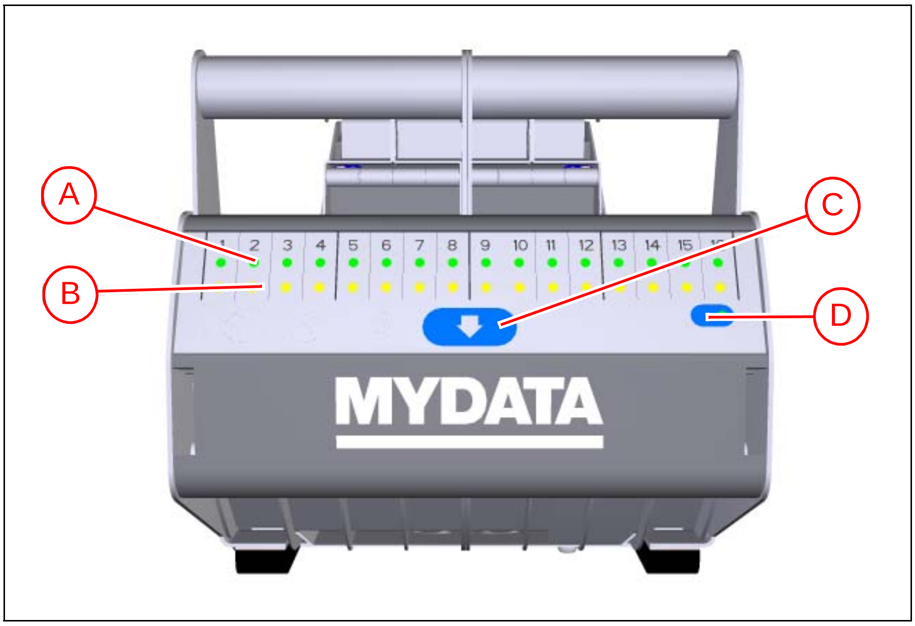


Figure 13-9. Information panel.

Electrical System

Schematics

All schematics regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Electric Parts

QMC (Quick Magazine Control)

The QMC (Quick Magazine Control) is located inside the ALM. The main functions of the board are:

- Storage of serial and type number.
- Identification of 'my turn'/addressing.
- Connection of feeding to the magazine bus.
- Storage of button data and LED power.
- Its own 5V power regulator.
- Reading of transducer.

Functional Test

Use the procedure below to perform a poll of the removable feeders in the magazine.

Polling Removable Feeders

Polls magazines that are equipped with removable feeders.

1. Start the *Service Program* by selecting *Exit* > *Exit To Service.*
2. Select *Magazine* > *Poll removable feeders.*
3. Select the desired magazine by entering the magazine position in the *Select slot* dialog box. The polling result is displayed on the monitor as follows:

```
_______ Poll removable feeders_______
                    Serial number
  Feeder      ((dec))       ((hex))
  ==========  ==========  ========
   1          16779431    0x10008a
   2          16779833    0x1000a3
   3          3           0x3
   4          16780099    0x1000b4
   5          3           0x3
   6          3           0x3
   7          3           0x3
   8          3           0x3
   9          3           0x3
  10          3           0x3
  11          3           0x3
  12          3           0x3
  13          3           0x3
  14          3           0x3
  15          3           0x3
  16          3           0x3
```

The serial numbers are presented both by decimal and by hexadecimal notation in the information box.

If the decimal serial number is '3', it means that the system has found no Agilis feeders in that position. Apart from the obvious reason of no feeder inserted, it can be caused by:

– Poor contact between the Agilis feeder and the Magazine.

– Faulty Agilis feeder ID circuit board.

Repair Guidelines

The following *Repair Guides* are available for the ALM (Agilis Linear Magazines) and ALMFLEX magazines.

Repair Guide REAR HANDLE P-014-1573-EN
Repair Guide MOTOR P-014-1571-EN
Repair Guide SOLENOIDS P-014-1567-EN
Repair Guide ENCODER... P-014-1566-EN
Repair Guide OLDHAM COUPLING.................................. P-014-1565-EN
Repair Guide DRIVE UNIT P-014-1548-EN
Repair Guide SAFETY CLAMP... P-014-1534-EN
Repair Guide FEEDER HEAD KIT...................................... P-014-1513-EN
Repair Guide ROLLER ARM P-014-1577-EN
Repair Guide UNCOVER ROLLER...................................... P-014-1578-EN
Repair Guide TAPE ROLLER MOTOR................................ P-014-1579-EN
Repair Guide FEEDER HEAD P-014-1580-EN
Repair Guide TAPE COVER STRAP.................................... P-014-1581-EN

All *Repair Guides* regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Use only authorized parts, to keep original level of machine safety. Any damage or malfunction caused by the use of unauthorized parts is not covered by warranty or product liability. Improper maintenance, deficient installation and not verified products can lead to serious defects and early loss off system performance. In case of an incident, the use of not original products and spare parts has wide-ranging legal effects including the expiration of the national and international type approvals.

AM8 (Agilis Magazine 8)

The AM8 (Agilis Magazine 8) is a tape magazine for 8 mm tape.

System Description

Removable feeders are used to bring the components to the placement head. These feeders make reloading of components fast and easy. You can run any combination of normal and fine pitch component tapes in an Agilis M8 Magazine.

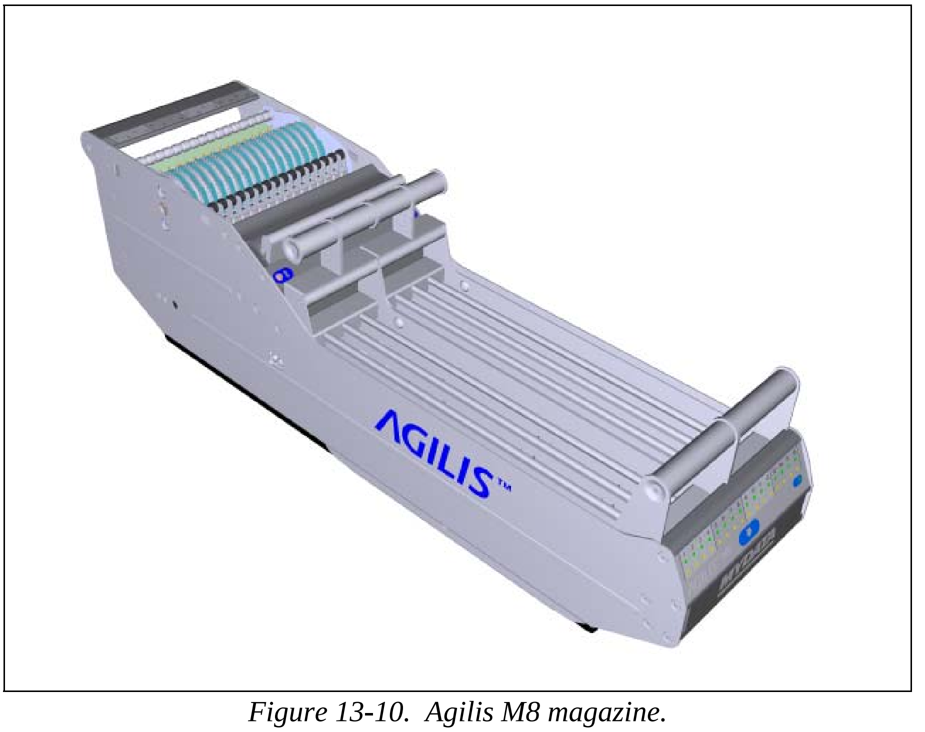


Figure 13-10. Agilis M8 magazine.

The mechanics are basically the same as in the old TM magazine, but in Agilis the feeder and the feeder mechanism are removable units.

The Agilis has two code plates, one on the motor shaft and the second is direct on the eccentric shaft that moves the feeder arms.

The board that connects the magazine with the machine is the QMC board.

Panel

The ALM has the same information panel as Agilis M8. See section *Magazine Panel* on page 13-12 for details.

Electrical System

Schematics

All schematics regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Electric Parts

QMC (Quick Magazine Control)

The QMC (Quick Magazine Control) is located inside the AM8. The main functions of the board are:

– Storage of serial and type number.

– Identification of “my turn”/addressing.

– Connection of feeding to the magazine bus.

– Storage of button data and LED power.

– It's own 5V power regulator.

– Reading of transducer.

Functional Test

Polling Removable Feeders

AM8 use the same removable feeders as ALM. Therefore polling of the feeders are done in the same way (see section *Polling Removable Feeders* on page 13-14).

Adjustments

This section describes how to adjust the pick line on AM8.

AM8 (Agilis Magazine 8) Pick Line Adjustment

The pick line in Agilis M8 is adjustable in Y direction mechanically and in X direction through TPSys, see *Operator's Manual.*

To adjust the pick line Y direction, use the two Allen screws positioned on top of the magazine near the feeders, see Figure 13-11. You can do the adjustment with the magazine inserted in the machine and instantly see the result on the screen.

We recommend you to adjust feeder position 1 first and then position 16. Use a 3 mm Allen key.

Use the step feeder function, key <F4>, to assure that the component is in pick position before you make the adjustment.

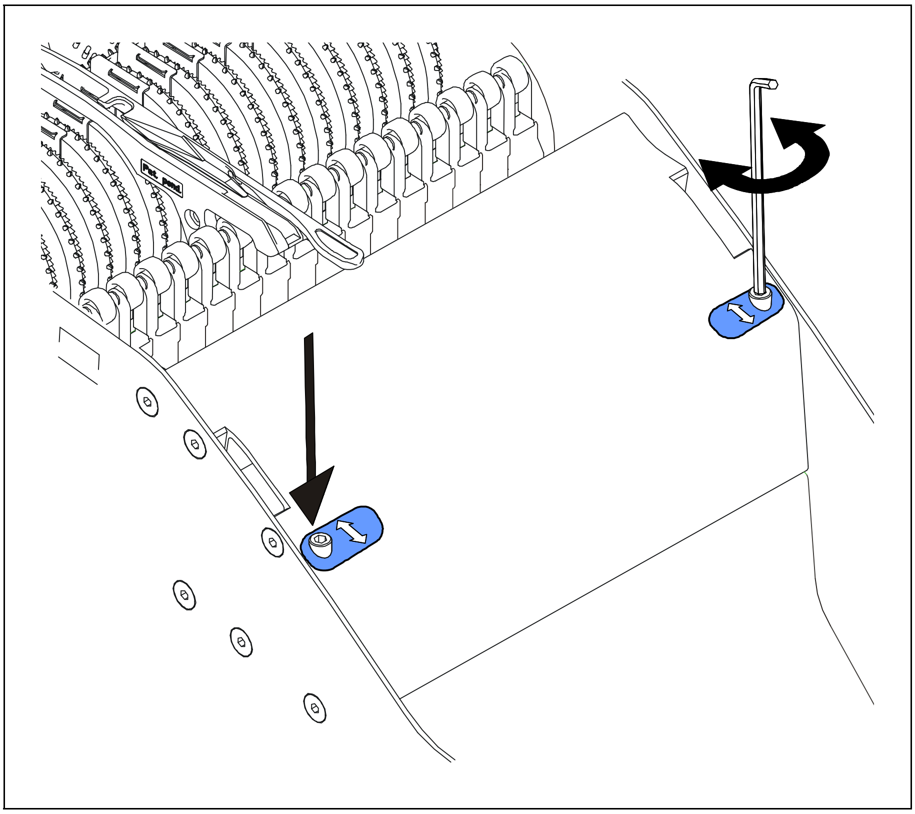


Figure 13-11. Adjusting Pick line Y direction.

Troubleshooting

This section describes how to locate errors that may occur and suggestions on how to solve the problems.

The troubleshooting chapter is divided as follows:

Start in the first localization section. You will then be guided to the appropriate part of the other sections.

Locating Errors

The following table helps you to find out if an error is located in the Agilis magazine or in the base machine.

An error has occurred	
Is the Magazine correctly inserted?	**No** – Insert properly. **Yes** – Do the test below.
Does the magazine work in other magazine positions?	**Yes** – Most likely the magazine position does not work properly. Go to the *Machine Errors* section. **No** – Do the test below.
Do other Magazines work in the magazine position?	**No** – Most likely the magazine position does not work properly. Go to the *Machine Errors* section. **Yes** – Most likely the error is located in the Agilis M8 Magazine. Go to the *Magazine Errors* section.

Magazine Errors

This section contains errors located in the Agilis magazine and suggestions on how to solve the problems.

LED Indicated Error

This table contains errors indicated by the LEDs on the rear handle and how to solve these problems.

Symptom	Action
None of the LEDSs are lit.	Check if the control board cables are connected? **If No** – Connect the Magazine board cables through the main opening underneath the Magazine. **If Yes** – Replace the control board. *If control board is replaced but LEDs not lit* – Replace the rear handle. *Note*! If it is a faulty rear handle unit, put the old control board back since it is probably intact and has the original serial number.
The LEDs are not lit according to the loaded feeder's position and TPSys does not detect the magazine.	Replace the control board. *If replacing control board does not solve the problem* – Replace the handle unit. *Note*! If it is a faulty rear handle unit, put the old control board back since it is probably intact and has the original serial number.
Yellow LEDs are lit but only for a short while.	Try feeders that you know work in other magazines. *If other feeders do not solve the problem* – Replace the control board. *If replacing control board does not solve the problem* – Replace the interconnection board. *Note*! If it is a faulty interconnection board, put the old control board back since it is probably intact and has the original serial number.
A feeder is not detected in a single feeder position.	Check if the feeder work in other magazines. – If not replace the feeder. *If the feeder work in other magazines* – Check the condition of the interconnection board connectors (there are double connectors for each of the two contact areas). *If no fault with interconnection connectors* – Change the interconnection board.

Pick Error

This section contains component pick errors and how to solve the problems.

Check		Action
Out of components?	Yes	Load a new component reel.
	No	See below.
Is the pick line adjusted?	No	Adjust the pick line according to the *Operator´s Manual*.
	Yes	See below.
Is the tape transport free from interference?	No	Make sure the tape can run smoothly from the reel to the feeder.
	Yes	See below.
Is the feeder properly inserted in the Magazine?	No	Make sure the feeder wheel spikes are positioned in the component tape feeding holes.
	Yes	See below.
Is the feeder properly loaded?	No	Reload the feeder according to the Operator´s Manual.
	Yes	See below.
Are the feeder wheels running?	No	See the *Feed Error* section.
	Yes	See below.
Are the feeder wheels running evenly and smoothly?	No	Assure the free movement of the wheels by adjusting the nut on the feeder wheel unit.
	Yes	See below.
Are the feeder wheels intact?	No	Replace the feeder wheel unit.
	Yes	Make sure there are no components or other things stuck between the feeder wheel cogs.

Feed Error

This section contains feed errors and how to solve the problems.

Check		Action
Do you hear the motor running for about a second?	No	Replace the motor unit. If this does not solve the problem – replace the control board.
	Yes	See below.
Do you hear clicking sound from the solenoids?	No	Make sure the connectors to the solenoids are properly connected (20-pole flat cable). Check both the connectors at the control board and at the solenoid unit. If the cable is loose, reconnect it. If this does not solve the problem – replace the control board. If this does not solve the problem – replace the solenoid unit. Note! If it is a faulty interconnection board, put the old control board back since it is probably intact and has the original serial number.
	Yes	See below.
		Make sure there are no components or other things stuck between the feeder wheel cogs.

Machine Errors

This section contains errors indicated by the LEDs on the rear handle, located in the machine and suggestions on how to solve the problems.

Symptoms	Action
The LEDs are not lit the way they are supposed to.	Check if *any* LEDs are lit. Make sure there are no components or other things stuck in the Magazine slot connectors – check all the slots.
LEDs are lit but TPSys does not detect any Magazine.	Check the XMIF cable between the computer box and the Magazines.
LEDs are lit and TPSys does detect the Magazine	Make sure there are no components or other things stuck in the Magazine slot connectors – check all the slots. If the action above does not solve the problem – Change the driver circuits on the MI board (ULN2003, L603 or L702). If the action above does not solve the problem – Replace the MI board and/or the MOT-M or the MCU.

Repair Guidelines

The following *Repair Guides* are available for the AM8 magazines.

Repair Guide TAPE SUPPORT	P-014-1547-EN
Repair Guide BELT REPLACEMENT	P-014-0930-EN
Repair Guide QMC REPLACEMENT	P-014-0929-EN
Repair Guide FEEDER WHEEL SET	P-014-0928-EN
Repair Guide WASTE SHELF REPLACEMENT	P-014-0926-EN
Repair Guide DRIVE UNIT FRAME KIT	P-014-0925-EN
Repair Guide SAFETY CLAMP	P-014-0924-EN
Repair Guide ECCENTRIC SHAFT	P-014-0922-EN
Repair Guide Y-ADJUSTMENT UNIT	P-014-0923-EN
Repair Guide SAFETY CLAMP	P-014-0924-EN
Repair Guide QMFIB REPLACEMENT	P-014-0921-EN
Repair Guide SOLENOID UNIT KIT	P-014-0920-EN
Repair Guide LOCKING UNIT	P-014-0919-EN
Repair Guide FEEDER WHEEL UNIT	P-014-0918-EN
Repair Guide REAR HANDLE REPLACEMENT	P-014-0917-EN
Repair Guide MOTOR UNIT REPLACEMENT	P-014-0916-EN
Repair Guide DRIVE UNIT REPLACEMENT	P-014-0915-EN
Repair Guide INTERFACE PARTS	P-014-0914-EN

All *Repair Guides* regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Use only authorized parts, to keep original level of machine safety. Any damage or malfunction caused by the use of unauthorized parts is not covered by warranty or product liability. Improper maintenance, deficient installation and not verified products can lead to serious defects and early loss off system performance. In case of an incident, the use of not original products and spare parts has wide-ranging legal effects including the expiration of the national and international type approvals.

TM – Tape Magazines

TM magazines are available for a range of tape widths – 8 mm – 56 mm. There is also a TM Flex magazine available which have removable feeders with internal tape feeding.

System Description

The TM tape magazines can handle all tape materials – paper, plastic and aluminium. They do not have removable feeders like the Agilis range of magazines.

The TM Flex magazine uses separate TM Flex feeders that are attached to the magazine body. In this way the customer can buy a single 56 mm feeder, another 24 mm. etc. to meet the need for his specific production without buying a complete magazine for both 24 and 56 mm feeders.

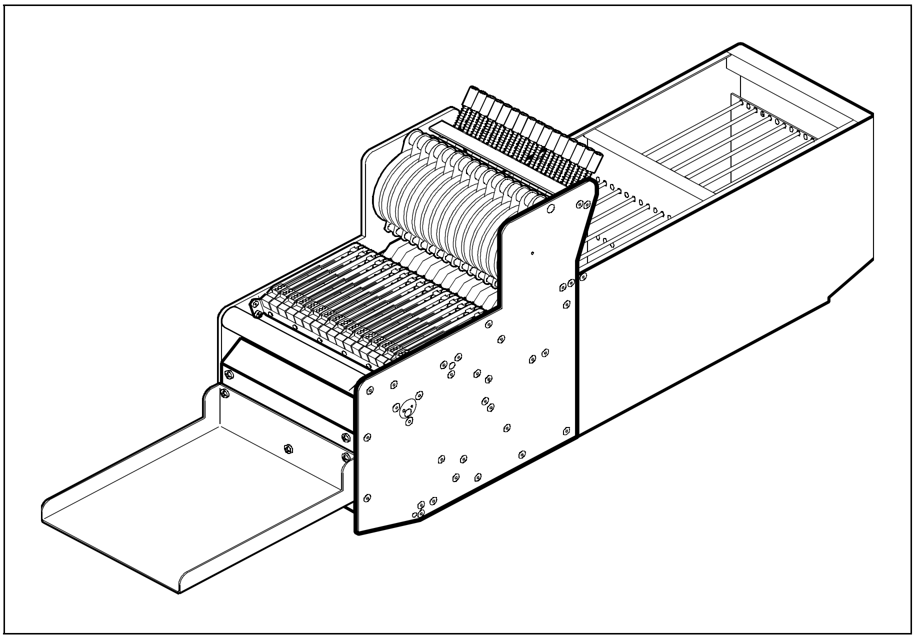


Figure 13-12. TM8 tape magazine.

Functional description

When a command is sent from TPSys to a magazine, the electronics in the magazine chooses which feeder to feed by activating the correct solenoid, see 'E' in Figure 13-13. When the solenoid is activated it will push up the feeder arm ('B'). The feeder arm is then pushed sideways ('D') as it is mounted on an eccentric shaft called drive axle that will rotate one revolution.

The drive axle will always start the revolution when the feeder arm is in its right most position in the figure. This will finally make the feeder wheel turn one step ('C' in 13-13).

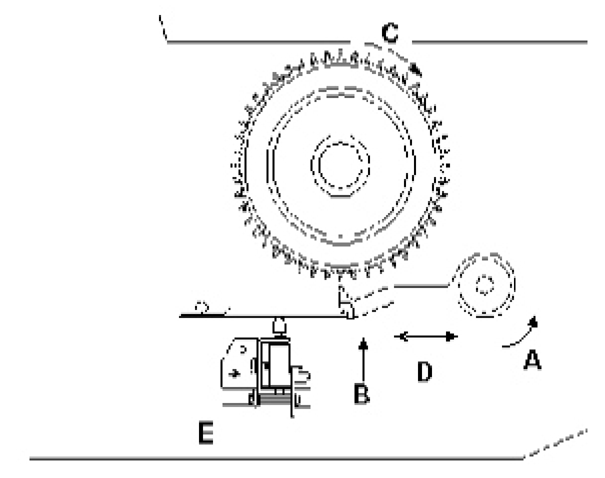


Figure 13-13. Magazine mechanics.

Two code plates are used to control the drive axle. One is used to adjust the start position ('A' in Figure 13-14) and the other ('B') to control that the drive axle turns exactly one revolution. A belt is driving the eccentric axle.

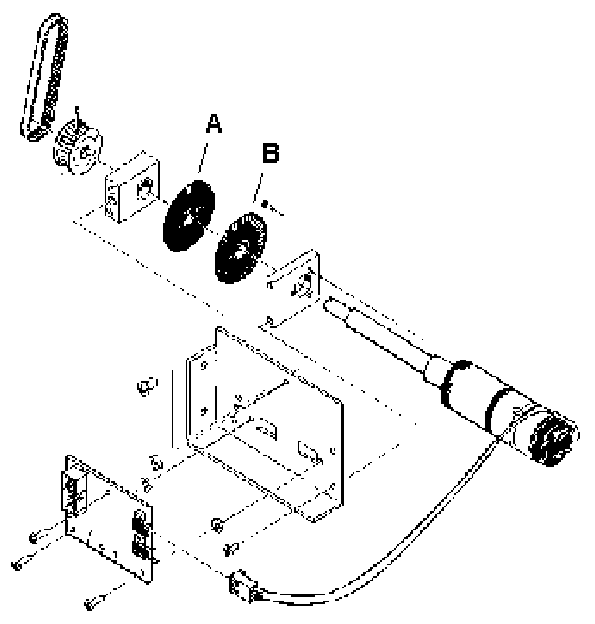


Figure 13-14. Motor and code discs

TM (Tape Magazine) User Interface

This section describes the function of the release button and status LED's in the magazine.

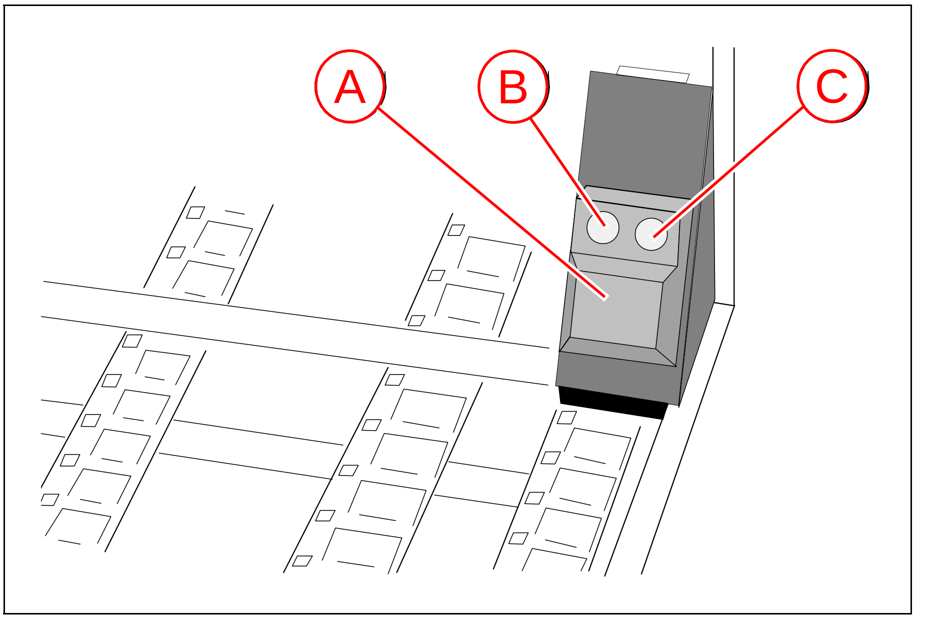


Figure 13-15. Release button and status LEDs.

All TM Magazines is outfitted with a release button ('A' in Figure 13-15) which has a green LED ('B') and a yellow LED ('C').

Release button (1)

Press this button and wait until the green LED is off before removing the magazine from the machine.

This button resets magazine errors for the magazine, in other words. equivalent to removing or inserting the magazine.

Green LED (2)

Steady light	The magazine is recognized by the system and will be used.
Flashing	The release button has been pressed.
Off	The system does not use the magazine.

Yellow LED (3)

Steady light	At least one feeder is empty or a pick error has occurred.
Off	In operation.

Electrical System

Schematics

All schematics regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Electric Parts

TC2 (Tape Magazine Controller Board 2)

The TC2 (Tape Magazine Controller Board 2) is used for controlling the TM (Tape magazine) and is located inside the TM. The main functions of the board are:

- Storage of serial and type number.
- Identification of “my turn”/addressing.
- Connection of feeding to the magazine bus.
- Storage of button data and LED power.
- Its own 5V power regulator.
- Reading of transducer.

TCL (Tval Button and LED Board)

The TCL (Tval Button and LED Board) holds the integrated button and LED's in tape magazines with TC2 (Tape magazine Controller board 2). It contains only the button and the cable connection, no components.

TMC (Tape Magazine Connection)

The TMC (Tape Magazine Connection) is located in the tape magazine and is a connection board for reel select magnets. It contains no components.

MS (Motor & Slotted Switches Board)

The MS (Motor & Slotted Switches Board) is located in the tape magazine and includes the position detection of the tape drive motor by two slotted opto-switches. Also the tape drive motor connections are placed on this board.

Functional Tests

This section comprises the following functional tests.

– *Test Magazine* on page 13-28.

– *Polling Magazines* on page 13-28.

Test Magazine

This option tests major functions of the selected magazine.

1. Select *Exit* > *Exit To Service*.
2. Select *Magazine* > *Test*.
3. Select the desired magazine by entering the magazine position in the *Select slot* dialog box:

   A continuously updated test result for the selected magazine is shown.

Function	Setting	Description
Test result	Passed	A communication test completed successfully.
	Off	The test was not successfully completed.
Button	No	The release button on the magazine is released.
	Yes	The release button on the magazine is pressed in.
Lamps	Off	Both of the LEDs are temporarily off, or the LED test was not successfully completed.
	Yellow	The Yellow LED only is temporarily lit.
	Green flash	The Green flash LED only is temporarily lit.
	Yellow flash	Yellow flash of the LEDs are temporarily lit.

The *Button* and *Lamps* status shall reflect the visible states of these functions on the magazine.

Polling Magazines

Polls those magazines which are inserted in the machine.

1. Select *Exit* > *Exit To Service*.
2. Select *Magazine* > *Poll*.
3. The polling result is displayed on the monitor.

If the text in the *Buttoned out* column is *No* the magazine is in operation (the green LED on the magazine is lit with a steady light). If the text is *Yes* the system does not pick from the magazine (the green LED is either flashing or off). If it is neither of these but '---' the magazine type has no release button.

Adjustments

This section comprises the following measurements and adjustments.

- *Adjusting Pick-Up Position* on page 13-29.
- *Adjusting Feeder Arm Gap* on page 13-31.
- *Setting Code Disc Synchronization* on page 13-32.
- *Measuring Feeder Wheel Friction* on page 13-33.

Adjusting Pick-Up Position

TM magazine pick positions are adjusted by turning an eccentric disk on each side of the magazine as follows:

1. Insert the magazine and, select *Magazine* > *Locate Feeder Positions*.
2. Select feeder *1* and center the crosshairs on the component.
3. Make a few component advancements by choosing the *Step feeder* option in the upper left menu and check the Y-wise deviation.
4. Adjust feeder *1* by loosening three screws, see Figure 13-16. Turn the eccentric disc with two holes as shown in the figure.
   - Remove the magazine if inserted near the machine frame. Otherwise, it can be adjusted without being moved. If the eccentric disk is turned *counter-clockwise*, the pick-up position is moved forwards, see Figure 13-16.

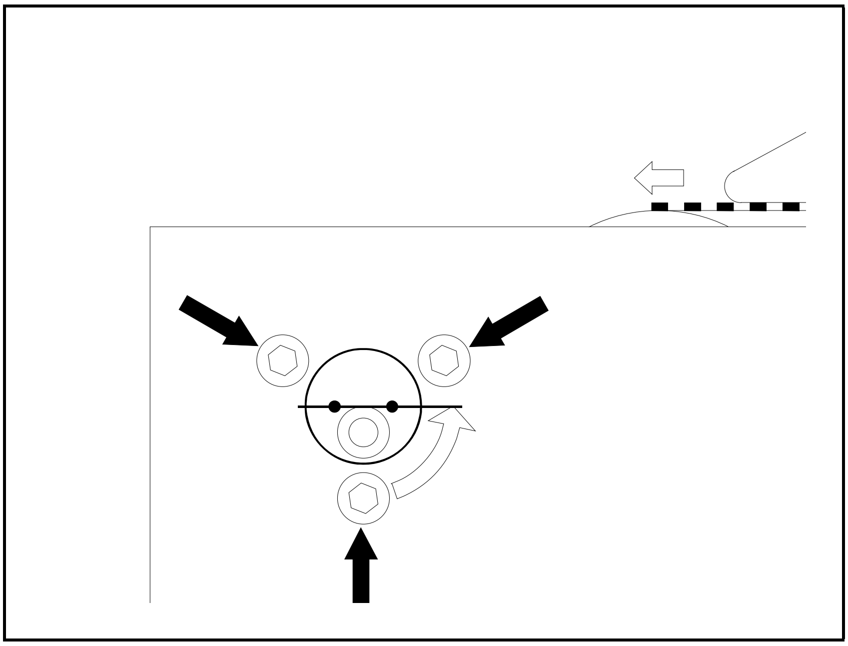


Figure 13-16. Magazine pick-up position, first feeder.

5. When the first feeder is adjusted, repeat step *2* to *4* on the last feeder in the magazine.

   If the eccentric disk is turned *clockwise*, the pick-up position is moved forwards (see Figure 13-17).

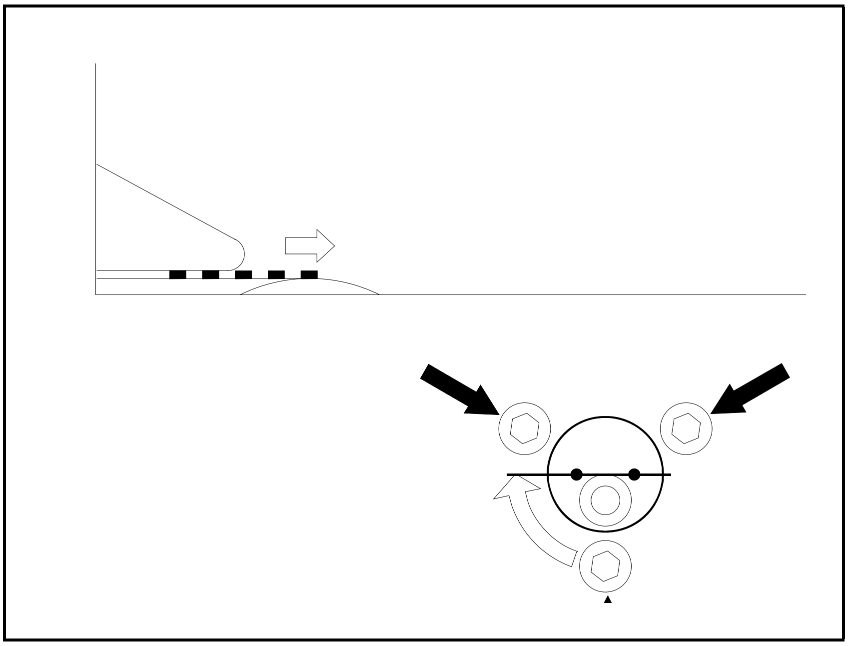


Figure 13-17. Magazine pick-up position, last feeder.

6. Return to feeder *1* and check the pick position again. Adjustments made on one side may affect the other side somewhat.
7. When both outermost feeders are properly adjusted, make sure the three screws are re-tightened properly on both sides.

The axle shaft points downwards when the magazine is set to default eccentric disk position (see Figure 13-18).

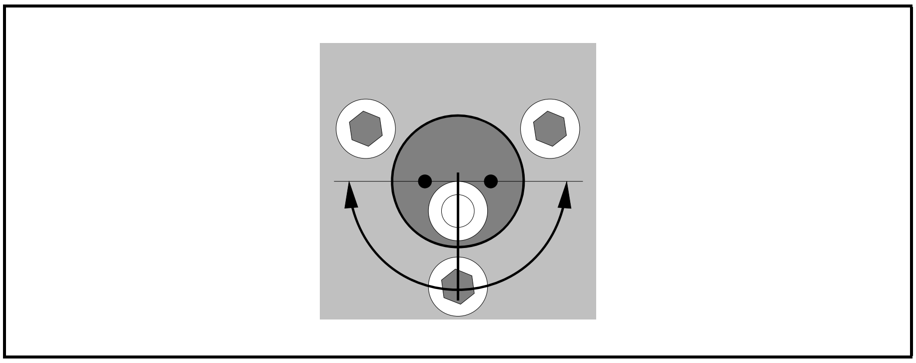


Figure 13-18. Default eccentric disk position.

From this position the adjustment range is 90 degrees forwards or reverse.

CAUTION! The belt tension is affected by this adjustment. If the eccentric discs are turned more than 10° the belt tension should be readjusted.

Adjusting Feeder Arm Gap

Procedure

1. Slightly tighten both the countersunk screws at the solenoid bar (one at each side of the magazine).

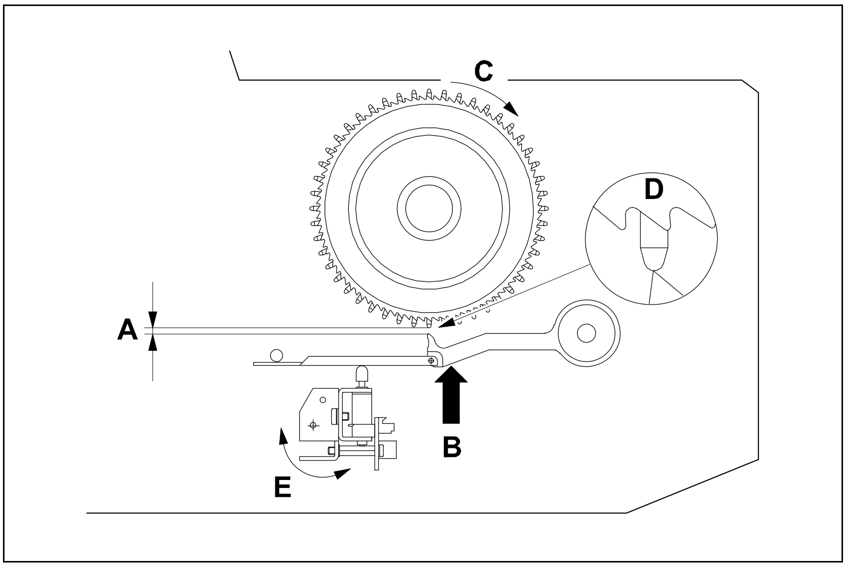


Figure 13-19. Feeder arm gap.

2. Adjust the gap between the feeder wheels and the feeder arm tips ('A' in Figure 13-19) by turning the solenoid bar.

   The gap should be 0.5 mm - 1.0 mm. Set the gap as follows:

   – Lift the outermost feeder arm ('B') by hand as much as the tip touches the feeder wheel.

   – Turn the feeder wheel ('C') while the feeder arm is lifted.

   – Stop turning the feeder wheel when the top point of a tooth passes ('D').

   – Compare the lifted feeder arm position to the released position and estimate the gap.

   – Turn the solenoid bar ('E') until the gap is 0.5 mm - 1.0 mm.

   – Slightly tighten the adjusting screw (protruding head) at the solenoid bar.

   – Repeat the procedure for the outermost feeder arm on the opposite side.

3. Turn all the feeder wheels. The feeder arm tips must not touch the wheels. Readjust if necessary.

4. Tighten the four solenoid bar screws.

5. Check the gap again. Readjust if necessary.

Setting Code Disc Synchronization

The code disc synchronization can be set either by using a pulse counter device or without using this device. The following describes setting the synchronization without a pulse counter device.

Procedure

1. Loosen the stop screw on the single hole code disc.

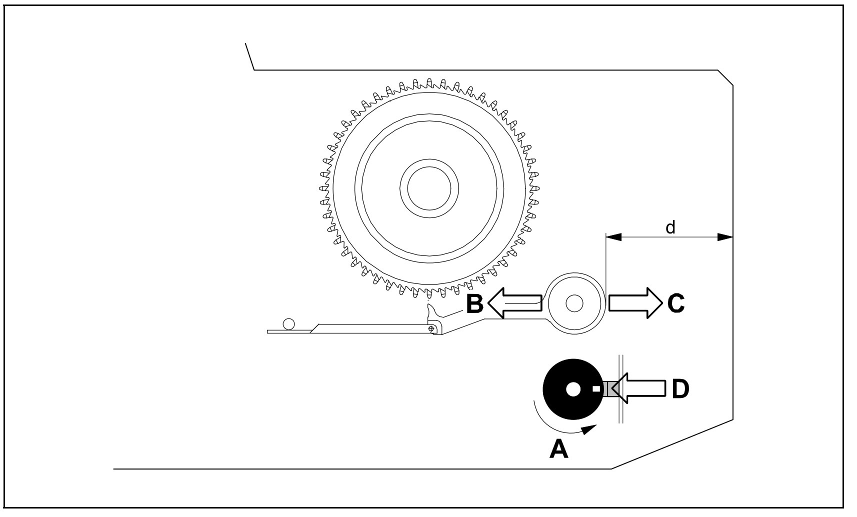


Figure 13-20. Setting the code disc.

2. Turn the multi-hole code disc by hand ('A' in Figure 13-20) until the eccentric shaft with the feeder arms are as far from the magazine front as possible ('B'), i.e. when the 'd' distance is maximum.
3. Measure the 'd' distance and note it down as 'd1.'
4. Continue turning the multi-hole code disc by hand until the eccentric shaft with the feeder arms are as close to the magazine front as possible ('C'), i.e. when the 'd' distance is minimum. 1.5
5. Measure the 'd' distance and note it down as 'd2.'
6. Calculate 'd3' as follows:

$$d3 = \frac{d1 + d2}{2} + 1.5$$

7. Again, turn the multi-hole code disc until the 'd' distance equals the calculated 'd3' distance.
8. Without turning the multi-hole code disc, turn the single hole code disc until the hole is in the optical sensor read off position ('D').
9. Without turning the code discs, position the single hole code disc in the middle of the optical sensor gap, and tighten the stop screw.
10. Check the setting by turning the single hole disc until the hole is in the optical sensor read off position and measure the 'd' distance. It shall correspond to the calculated 'd3' distance. If not, readjust the setting.

Measuring Feeder Wheel Friction

This procedure is for the TM8 – TM56 Magazines, but not for the TMFlex Magazines.

Requirements

– Piece of component tape.

– Dynamometer

Procedure

1. Measure the feeder wheel friction by putting a piece of component tape on the feeder wheel and pull the tape using a dynamometer (see Figure 13-21). The force required to rotate each wheel shall be 1 - 5N.

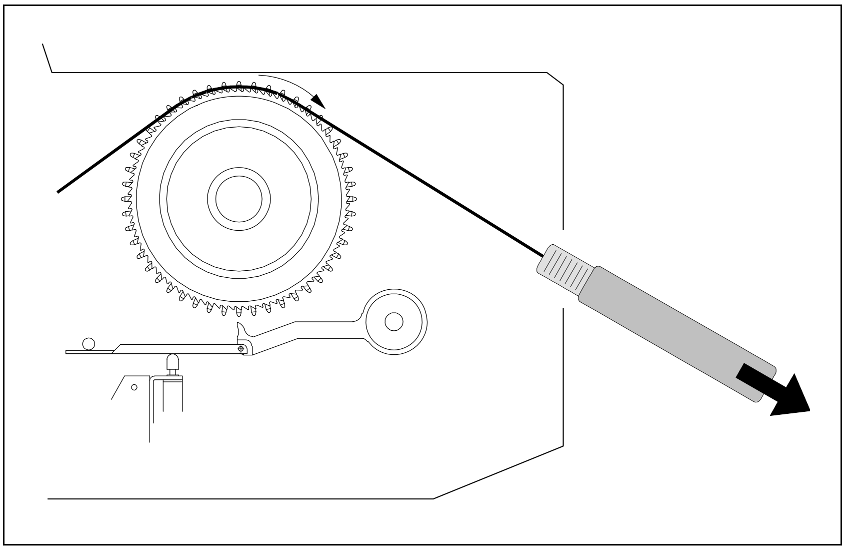


Figure 13-21. Feeder wheel friction measurement.

2. If necessary, adjust by turning the nut ('A' in Figure 13-22) clockwise to increase the friction, counter-clockwise to decrease it.

.

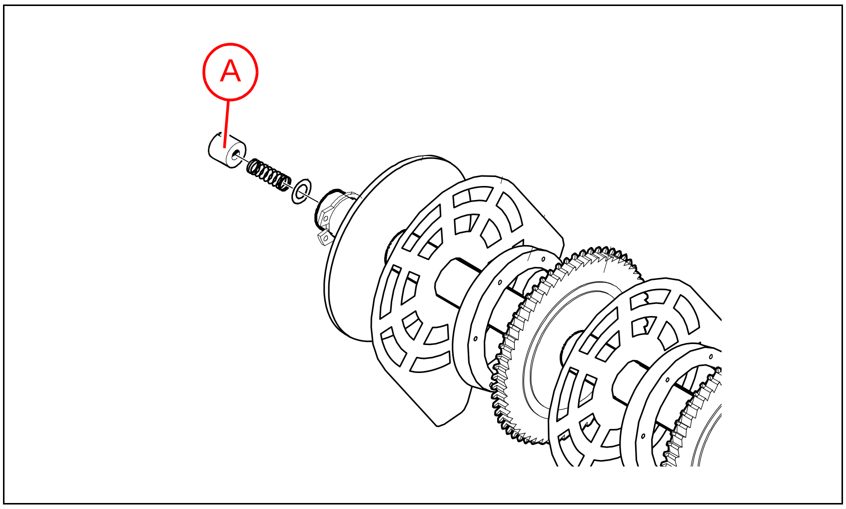


Figure 13-22. Feeder wheel pack end nut

ASM (Agilis Stick Magazine)

The ASM (Agilis Stick Magazine) is a new type of vibratory magazine intended for components distributed in sticks (plastic tubes). This magazine, belonging to the Agilis magazine family, is described in this section.

System Description

The Agilis Stick Magazine, ASM, contains mainly the drive device ('A' in Figure 13-23) for component feeding and the panel ('B').

An Agilis Stick Pallet, ASP ('C'), contains the feeder area where the sticks ('D') are inserted. The pallet is put on top of a magazine. Pallets and magazines have no individual connection to each other. Any pallet can operate with any magazine. A magazine can thus be exchanged with no programming or other action.

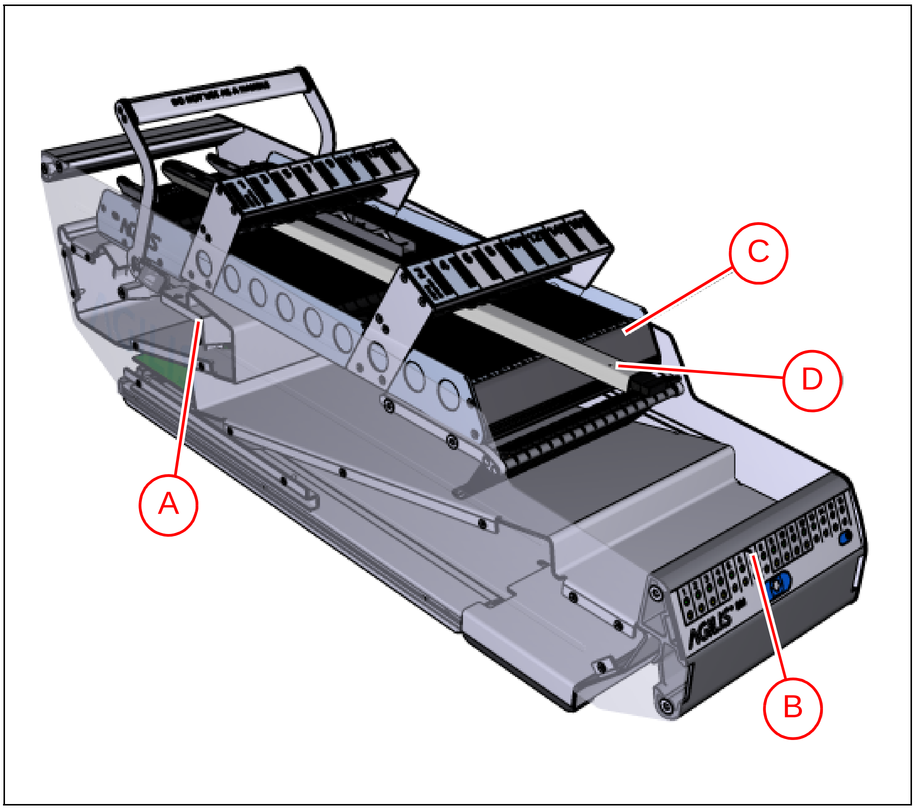


Figure 13-23. Agilis Stick magazine.

ASP (Agilis Stick Pallet)

The Agilis Stick Pallet, ASP, contains mainly a feeder area ('A' in Figure 13-24) with default feeder positions ('B'). The pallet has an identity read by TPSys. This identity consists of pallet type, serial number, and name. The latter can be renamed by the user. Each feeder position has its own identity, consisting of the feeder numbers 1–16. This makes it possible for TPSys to store individual feeder data for all pallets.

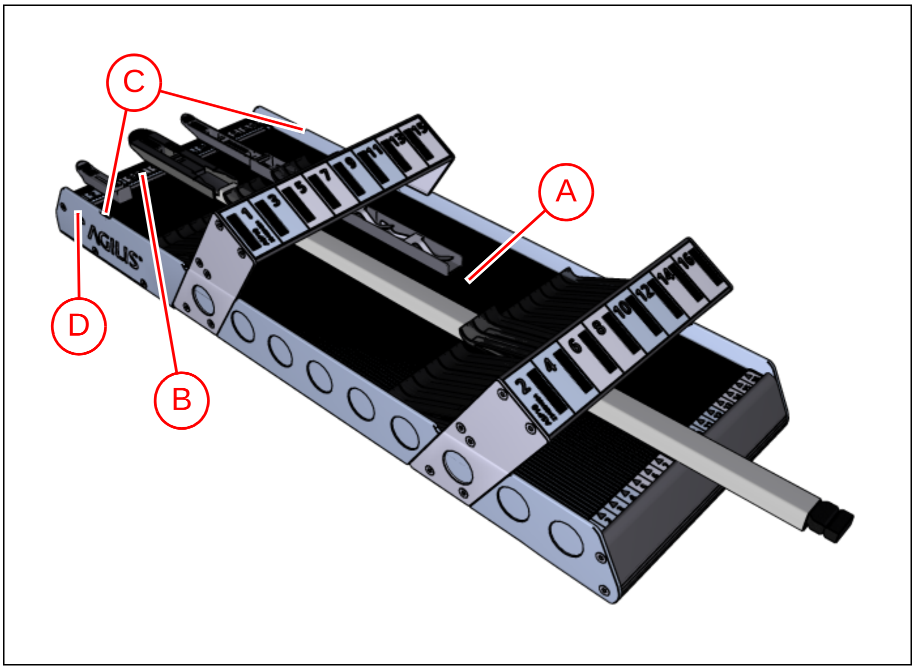


Figure 13-24. ASP (Agilis Stick Pallet).

There are two types of pallets:

– ASP10

This type is used for component sticks with a maximum height of 10.5 mm.

– ASP1028

This is a mixed type for component sticks with a maximum height of 10.5 mm and 28.5 mm. In this type the first eight feeder positions are for 10.5 mm and the second eight (9–16) for 28.5 mm. If you re-define feeder positions, make sure that position 1–8 are located on the higher part of the feeder area and 9–16 on the lower part.

Components in feeder position 9–16 cannot be picked with the HYDRA mount head.

Feeder width 10 mm cannot be used in positions 9 and 16.

There is a fiducial mark ('C') on each side of the pallet, in the pick line. These are used to locate the pallet in the machine in the same way as for other magazines. There is a hole ('D') on each side of the pallet, under the positioner slot. Dropped components can be removed through these holes by tilting the pallet.

Panel

The ASM has the same information panel as Agilis M8. See section *Magazine Panel* on page 13-12 for details.

Electrical System

Schematics

All schematics regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Electric Parts

QMC (Quick Magazine Control)

The QMC (Quick Magazine Control) is located inside the ASM. The main functions of the board are:

- Storage of serial and type number.
- Identification of “my turn”/addressing.
- Connection of feeding to the magazine bus.
- Storage of button data and LED power.
- It's own 5V power regulator.
- Reading of transducer.

Repair Guidelines

The following *Repair Guides* are available for the ASM (Agilis Stick Magazines).

Repair Guide AGILIS SM DRIVE UNIT P-014-1734-EN
Repair Guide AGILIS SM PALLET INTERF. UNIT.............P-014-1732-EN
Repair Guide AGILIS SM SPRING CLIP KIT.......................P-014-1731-EN

All *Repair Guides* regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Use only authorized parts, to keep original level of machine safety. Any damage or malfunction caused by the use of unauthorized parts is not covered by warranty or product liability. Improper maintenance, deficient installation and not verified products can lead to serious defects and early loss off system performance. In case of an incident, the use of not original products and spare parts has wide-ranging legal effects including the expiration of the national and international type approvals.

VM (Vibratory Magazine)

The VM (Vibratory magazine) is an older type of vibratory magazine intended for components distributed in sticks (plastic tubes). The VM is controlled by a VC board instead of the TC2 board that controls the TM magazine.

System Description

The method used to transport components in VM are very different from the method used in tape magazines. In a tape magazine each feeder is fed individually, in a VM three rails are fed with a specified amplitude, frequency and time. This requires that components with approximately the same weight must be put in the same rail, otherwise small components will risk jumping out of the stick if the parameters are set to handle heavy components, and heavy components will not feed fast enough if the parameters are set for small components.

The vibratory unit operates with 220 V AC, the VC board converts the incoming 12 V in the integrated transformer to 220 V AC.

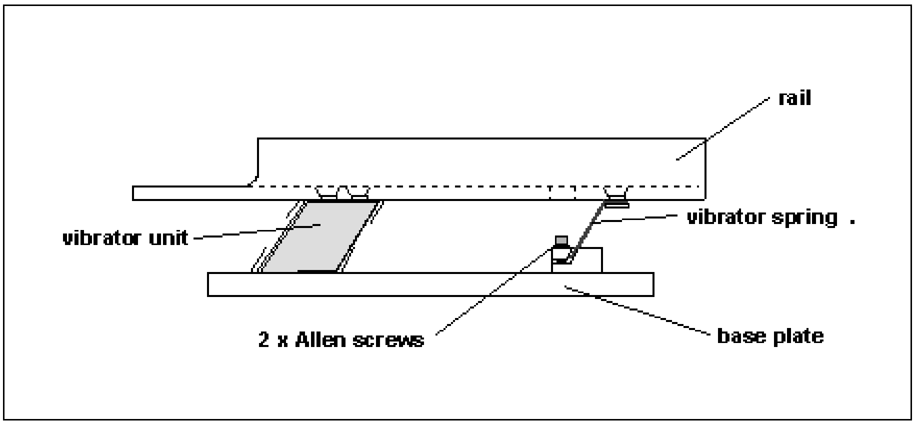


Figure 13-25. VM mechanics.

Electrical System

Schematics

All schematics regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Electric Parts

VC (Vibratory Control)

The VC (Vibratory Control) is used for controlling the VM and is located inside the VM. The main functions of the board are:

- Storage of serial and type number.
- Identification of 'my turn'/addressing.
- Connection of feeding to the magazine bus.

Adjustments

This section describes how to adjust the VM (Vibratory Magazine).

Adjusting the Vibratory Unit

The vibratory unit must be adjusted correctly to function properly. Adjust the vibratory unit to be in accordance with the values below.

- The gap between the solenoid and the top plate must be 0.5 mm.
- The top plate must not lean in any direction (maximum 0.1 mm. difference on parallelism on top plate to bottom plate).

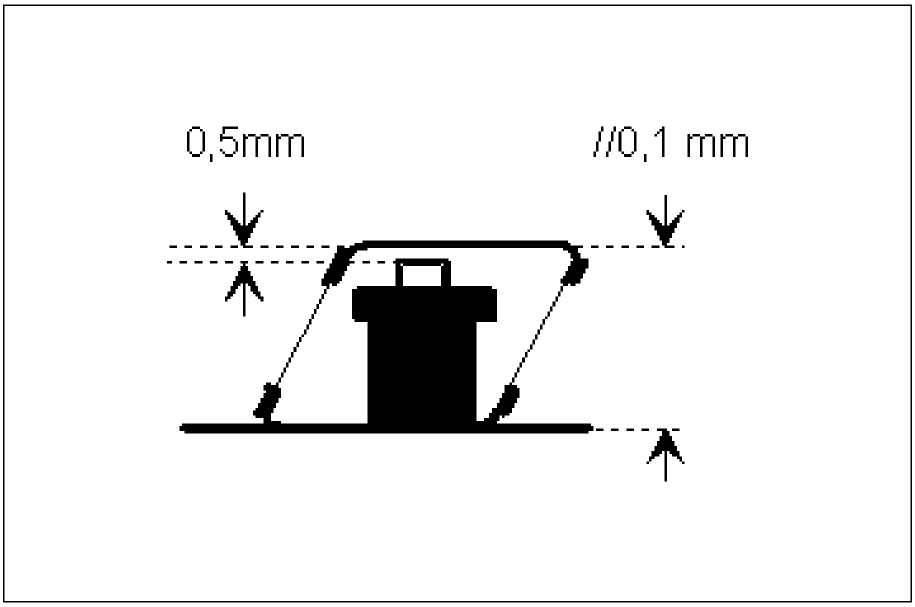


Figure 13-26. Adjusting vibratory unit.

TWM (Tray Wagon Magazine)

The TWM (Tray Wagon Magazine) is a simplified Y wagon that has a Y movement of its own. The table top can be of one, two or three slot positions width.

System Description

The table top ('A' in Figure 13-27) is attached to a belt driven tray table ('B'). The tray table is equipped with two plain ball bushings that slide along the round guide shaft ('C'). On the opposite side there are two pairs of ball bearings that glide in an u-profile shaped track.

The Tray Wagon Magazine is electrically connected to the Y wagon and is controlled by the YWB2 (Y Wagon Board 2). It also has a motor and an encoder.

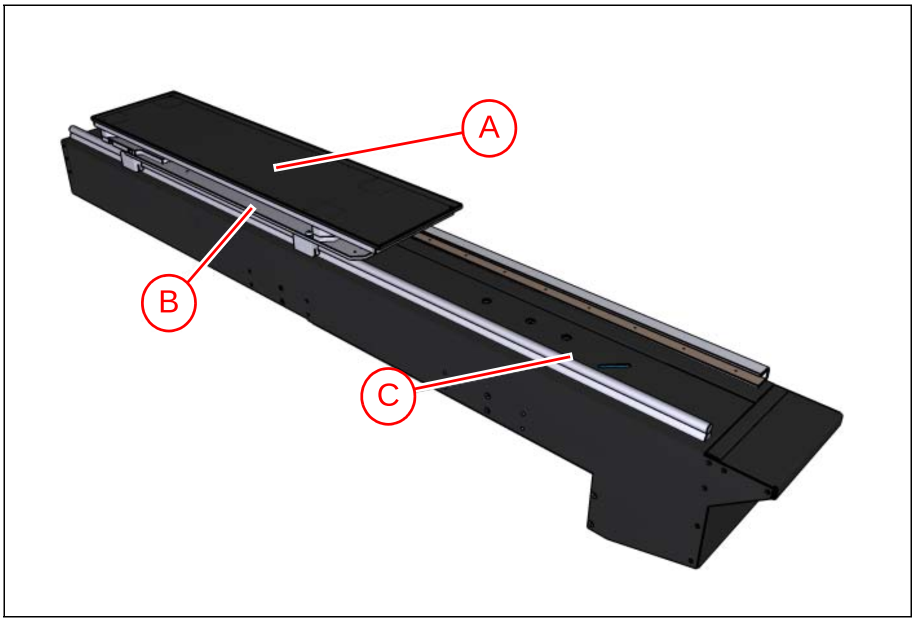


Figure 13-27. Tray Wagon Magazine.

Adjustments

This section comprises the following adjustments and measurement.The following procedure describes how to adjust the tray table and ball bushings if the friction is too high.

– *Adjusting the Tray Table* on page 13-41.
– *Aligning the Left Side Ball Bushings* on page 13-43.
– *Adjusting the Right Side Ball Bearings* on page 13-44.
– *Adjusting the Belt Tension* on page 13-45.
– *Measure Friction* on page 13-45.

Adjusting the Tray Table

1. Start by removing the table top from the TWM.

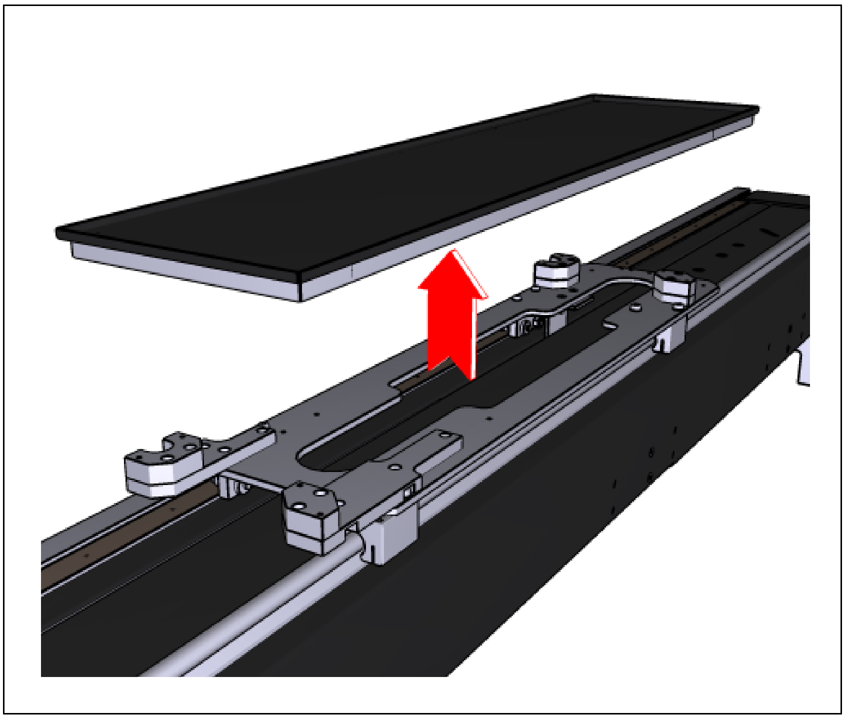


Figure 13-28. Remove the table top.

2. Continue by dismantling the tray table ('A' in Figure 13-29) from the belt fork ('B').

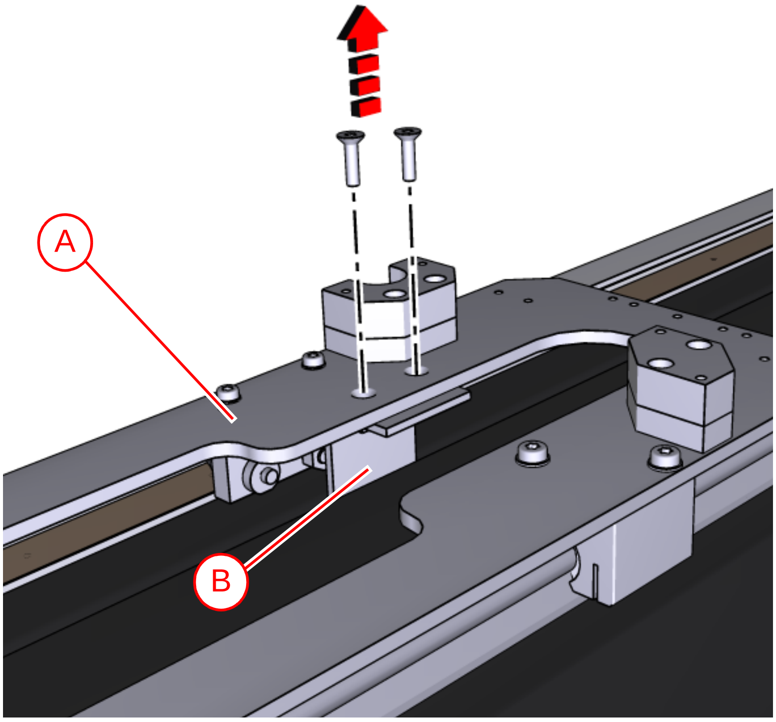


Figure 13-29. Loosening the belt fork.

3. Remove the tray table.
4. To determine it the tray table is curved, hold a steel ruler along the underside of the tray table's two ball bushings (see Figure 13-30).

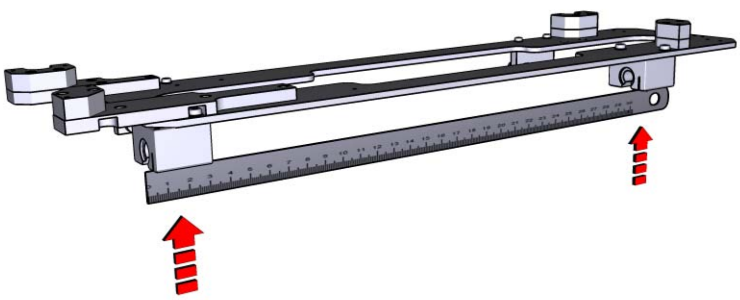


Figure 13-30. Check tray table straightness.

5. If the table is not straight, then gently try to straighten the table by hand.

Aligning the Left Side Ball Bushings

1. If the tray table has been removed, then reattach the tray table back on the TWM.
2. Remove the left table top support (see Figure 13-31).

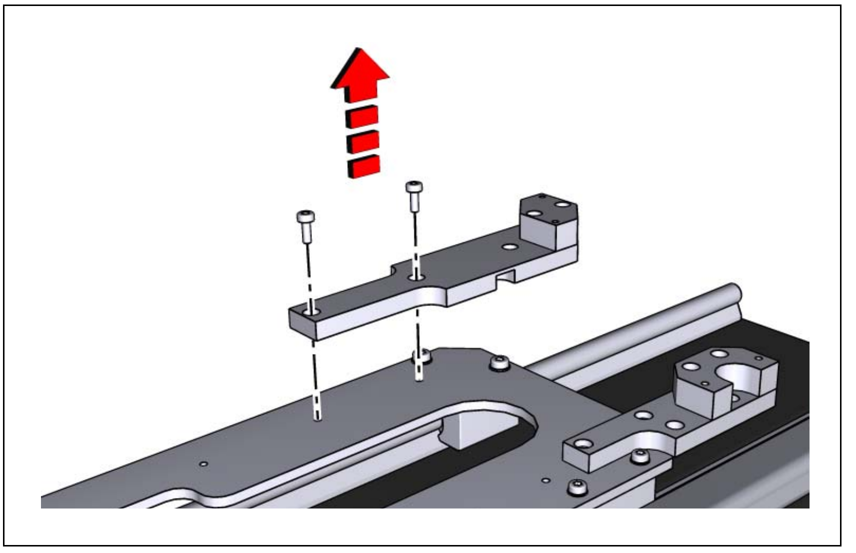


Figure 13-31. Remove left table top support.

3. Loosen the four screws ('A' in Figure 13-32) holding the two ball bushings ('C'.
4. Place a steel ruler ('B') between the two ball bushings. When they are aligned tighten the screws carefully. Make sure the tray table is centered over the screw holes.

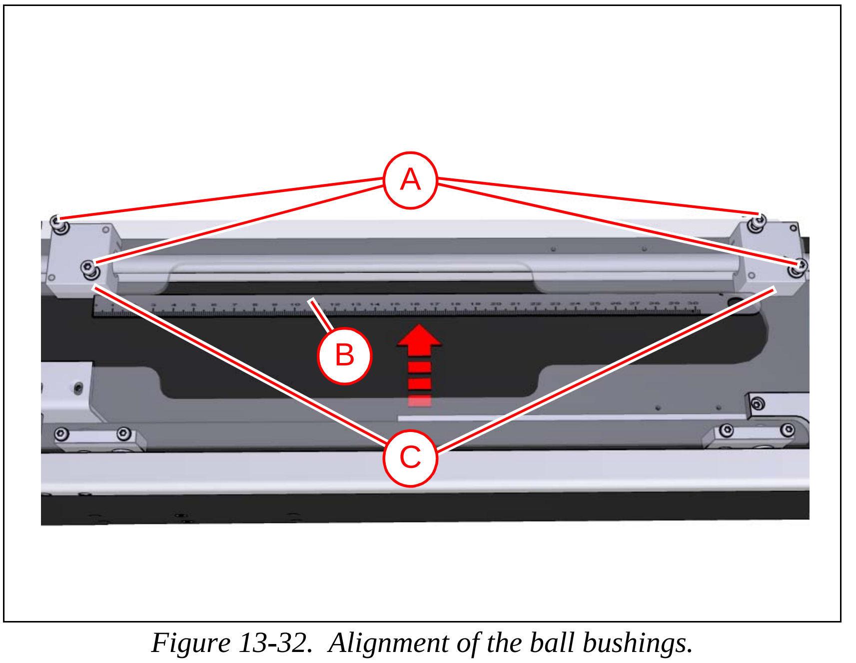


Figure 13-32. Alignment of the ball bushings.

5. Move the tray table slowly over the work area, make sure that the tray wagon moves freely along the guide shaft.
6. Reattach the belt fork. Make sure it is in the middle of the gap.
7. Check the tray wagon moves freely along the whole working distance.

Adjusting the Right Side Ball Bearings

The ball bearings on the right side must be adjusted so that they do not cause friction at any part of the runway.

1. Start by loosening the right ball bearing.
2. The ball bearings are eccentric and can be adjusted to press upwards or downwards in the u-shaped profile.
3. Hold the ball bearing in desired position and tighten the screw when satisfied.

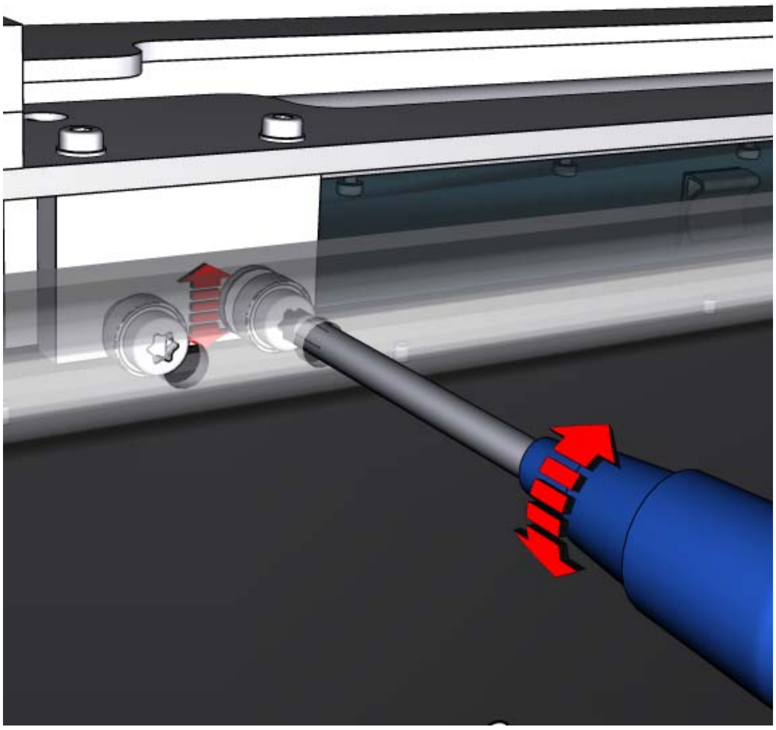


Figure 13-33. The right side ball bearings, and adjustment.

4. Repeat the previous procedure on the second ball bearing pair.
5. Make sure there is small vertical play along the whole working distance, it must not be too tight.

Adjusting the Belt Tension

1. Use a spanner ('A' in Figure 13-34) to loosen the nut holding the pulley ('B').
2. Insert an Allen key ('D') in the screw ('C') holding the pulley.
   – Moving the Allen key up in the slot pushes the pulley against the belt ('E') and thereby tightening the belt.
   – Moving the Allen key down in the slot releases the pulley's pressure against the belt and thereby slackening the belt.
3. The belt tension is normally ok when the pulley just about touches the belt.

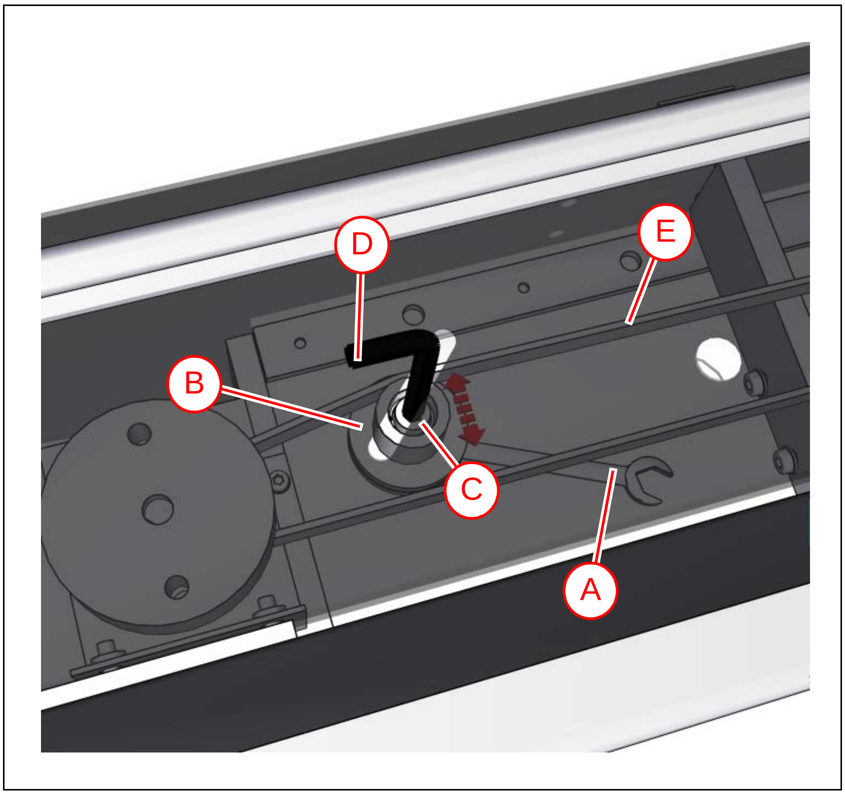


Figure 13-34. Adjusting the belt tension.

Measure Friction

Check your adjustment(s) by performing the procedure *Measure friction* in the service program. For details see *Appendix A - Service Program Reference Guide*.

– Use the default speed when testing friction.
– The friction should be a value between 12 and 20.
– If the friction is too high try redoing the latest adjustment(s) and test the friction again.

Installation and Removal

This section describes how to install and remove a TWM (Tray Wagon Magazine) on the MY100 machine.

Tray Wagon Magazine Installation

1. Insert the Tray Wagon magazine in a magazine position (see Figure 13-35). Any magazine position can be used for a one-module magazine. Two- and three-module magazines can be used in all magazine positions except for the positions required for the magazine top overhang.

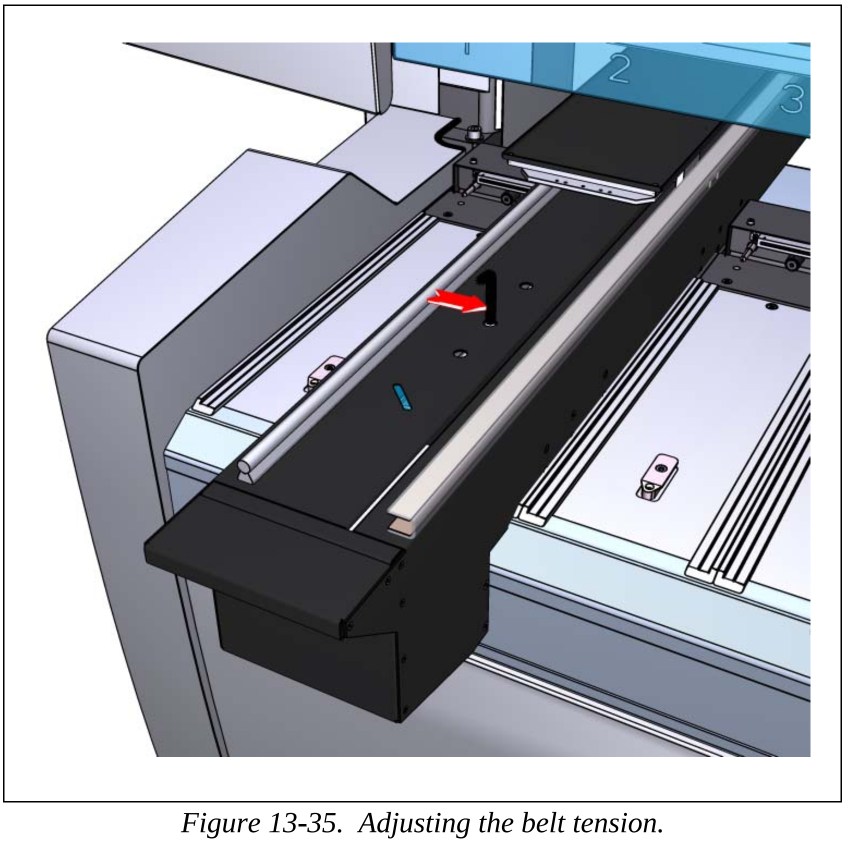


Figure 13-35. Adjusting the belt tension.

2. Use an Allen key to fasten the screw (see arrow in Figure 13-35) that secures the magazine to the machine table.
3. Select *Utility* > *Installation and Calibration* > *Tray Wagon Installation/Removal.* The *Connect the tray wagon magazine* dialog box is shown.

4. Connect the magazine cable to the XTWM (see Figure 13-36) connector located at the back of the YBOX, underneath the Y module.

   Press <Enter> when done.

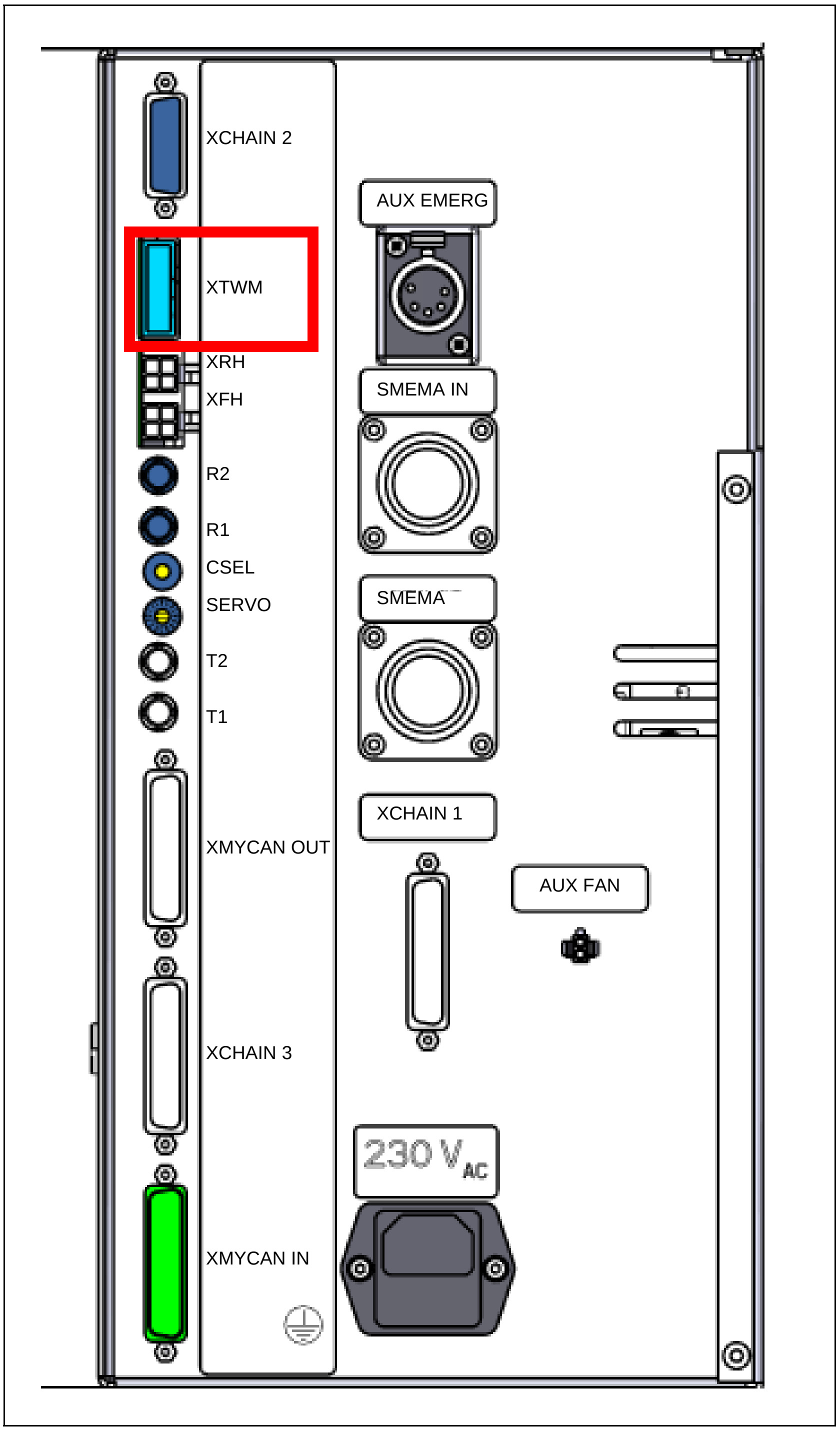


Figure 13-36. YBOX with XTWM connector.

5. Press <Enter> to verify *OK to initiate hardware?*
6. Enter the top table width of the magazine from the *Select table width* dialog box (1 – 3 magazine positions):
7. Check and, if incorrect, modify used magazine position number in the shown *Tray wagon position calibration* dialog box.

   For two or three-module magazines, the magazine position furthest to the left should be entered.

8. Calibrate the Tray Wagon Magazine position by centering the following marks on the tray wagon:
   - Lower left mark.
   - Upper right mark.
   - Lower right mark.
9. Restart any off-line terminal.

   The installation extends some of the TPSys menu options. Any off-line terminal that has been active during the installation must be restarted to make the installation take effect in the off-line menu system.

Tray Wagon Magazine Removal

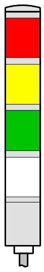
1. Select *Utility* > *Installation and Calibration* > *Tray Wagon Installation/Removal.*
2. The *Remove tray wagon?* dialog box is shown. Reply *Yes* to remove the tray wagon.
3. Press <Enter> when prompted *OK to initiate hardware?*
4. The system will indicate that the tray wagon magazine is un-installed. Disconnect the TWM cable connector at the rear of the magazine, loosen the fixing screw (see Figure 13-35) and remove the magazine.

14. Peripheral Systems

This chapter briefly describes the peripheral systems, which includes the following accessories:

– *Signal Tower* on page 14-2
– *Printer* on page 14-4.
– *Glue Station* on page 14-6.

Signal Tower



An optional signal tower that has red, yellow, green and white light in addition to a buzzer can be used to indicate the operational status of the machine.

The combination of light and buzzer signals for various machine states can be configured to match individual needs, which is described in the following sections.

The signal tower is controlled by the CP6 board and the unit is connected to the CP6 via XFCB (X Frame Connector Board). The signal tower is connected to the XTOW connector located on the XFCB. The connector carries +25V, GND and a number of control signals.

Signal connection:

Bit 0 = Red lamp

Bit 1 = Yellow lamp

Bit 2 = Green lamp

Bit 3 = Not connected

Bit 4 = White lamp.

Bit 5 = Not connected

Bit 6 = Buzzer

Bit 7 = Not connected

Machine States

The machine can be in seven different states, which are defined in the below default settings table. Each state can be indicated with the signal tower with a combination of lit lamps and activated buzzer. The lamps can have steady light or be blinking and the buzzer sound can be intermittent or continuous.

The combination of lit lamps, blinking lamps and buzzer sound for the various machine states is configured in a parameter file.

Default Settings

The settings shown in the following table is the default settings for delivered machines.

The desired combinations of lamp and buzzer signals for each machine state are set in the parameters. See the Software Manual for information on how to change these parameters.

Default signal	Machine state	Description
Green steady light	Running	Normal mounting or gluing operation.
	Waiting	The machine is running but it waits for loading or unloading the board.
Green steady light + yellow blinking + intermittent buzzer	Poor performance	The machine is running but components cannot be picked from at least one magazine feeder which may be out of components. The same component type is however available in another magazine feeder.
	Stops soon	The machine is running but components cannot be picked from at least one magazine feeder which may be out of components. The layout will not be completely mounted.
Yellow steady light	Idle/stopped	The machine - has not been started yet or - has finished mounting/gluing a layout. or - is stopped by the operator.
Red steady light + buzzer	Operator needed	The machine cannot complete the assembly without help from the operator. Typically caused by lack of components.
	Error	The machine is stopped due to a fatal error or by an emergency stop button(s).

Functional Test

Use the procedure below to test the function of the lamps in the Signal Tower

Testing the Signal Tower

1. If not already running, start the Service Program by selecting *Exit* > *Exit To Service* in the TPSys menu.
2. *Select Utility* > *Warning lamps.*
3. Select which lamp to be altered in the field named *Lamp*.
4. Each lamp can be set in three different states *On*, *Off* or *Blink* by moving the cursor to the desired field and pressing <Enter>.

Printer

A printer is an option with the machine. It is used to print out several kinds of data, for example:

- Component data.
- Package data.
- Magazine and tray data.
- Layout, panel and PCB data.
- Settings and parameters.
- Production data.

This section describes how to prepare the following printer for usage in TPSys:

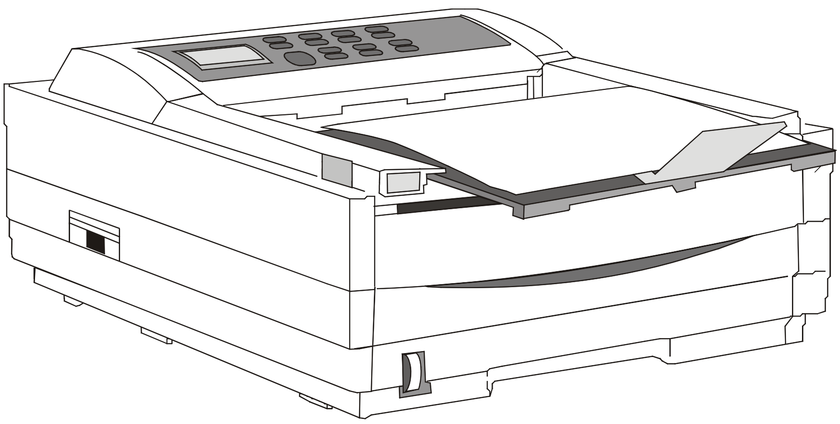


Figure 14-1. Printer.

Installation and Removal

This section describes how to install and remove the printer.

The printer is delivered in its original box. With the printer there is a manufacturers manual detailing how some of the steps below are to be performed.

1. Unpack the printer and check the contents according to the printer setup guide.
2. Install toner and load paper as per the printer manual.
3. Make sure the power for the MY100 machine is switched off.
4. Attach the power cord to the printer and the mains power. Plug the power cord into the printer first, then into a grounded outlet.
5. Insert the printer end of the cable firmly into the connector on the back of the printer. Fasten the cable to the printer securely.
6. The machine is connected to the printer via the DSUB connector, located in the front of the CB3 (Computer Box 3). See Figure 14-2.
7. Route the printer cable the same way as the power cord. Fasten the cable securely.

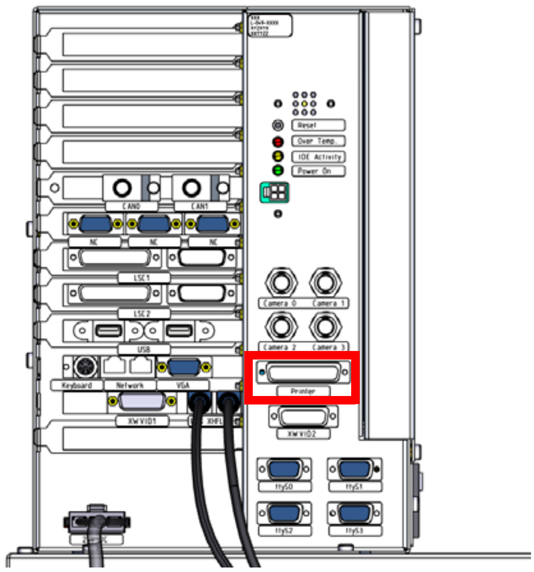


Figure 14-2. Printer connection.

8. Switch on the MY machine and turn on the printer. It takes about 10 seconds for the printer to initialize, warm up, and display the ON-LINE message, indicating the printer is ready to receive data.
9. Do not start TPSys.
10. Follow the description in the TPSys 2.9 Installation Guide, or software manual, on how to install and configure the printer. For details on operations of the printer, please refer to the printer manual.

    It is also possible to set printer options using the TPSys web interface.

Removal of printer

Refer to installation procedure in reverse order.

Glue Station

Some components need to be glued onto boards. For this purpose MYDATA has developed a glue station, which is a flexible unit that can be inserted into a prepared magazine position when needed. How to operate the glue station is described in the *Operators Manual*.

System Description

Figure 14-3 points out the main parts of the glue station. These parts are briefly mentioned below.

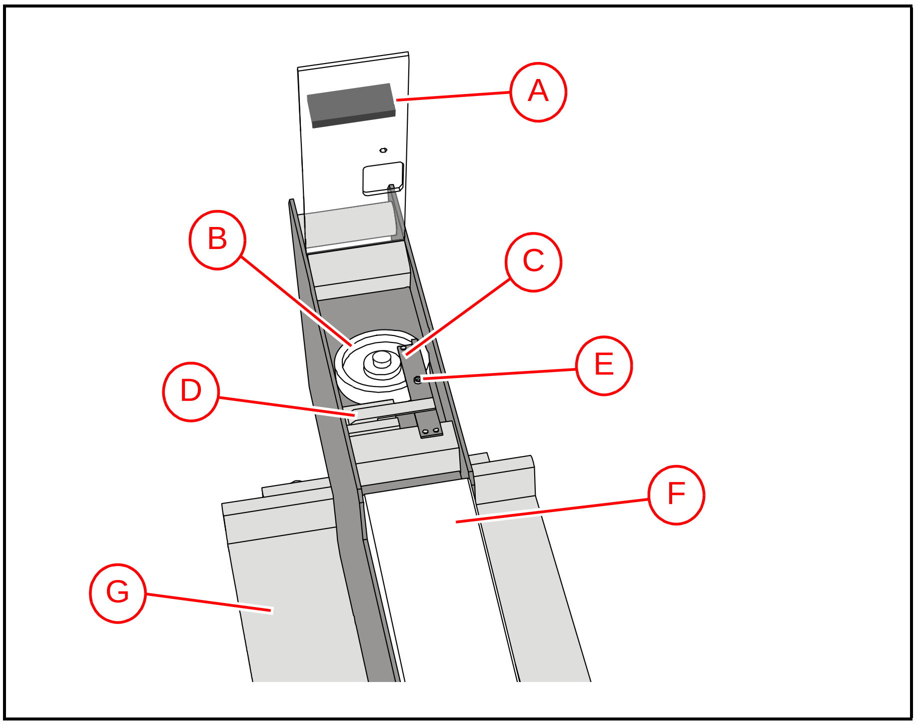


Figure 14-3. Glue station parts.

The glue station has the following main parts:

– Plastic cover with handle ('A' in Figure 14-3).

– Glue pot ('B').

  The glue is kept in this rotating glue pot.

– Leveling arm ('C').

  This arm has a rake underneath, which ensures that the surface of the glue is kept smooth.

– Tension arm ('D').

  Keeps the leveling arm in place.

– Adjustment screw ('E').

  The leveling arm is adjusted to an appropriate level above the glue surface with this screw.

– Cover ('F').

– Base plate ('G').

  The glue station is inserted into a magazine position.

Installation and Removal

This section describes how to install and remove the glue station.

The glue station is inserted into a magazine slot. Due to certain preparations, this slot will be dedicated for use with the glue station. The function, as to magazines, will not be affected by this preparation.

Depending on machine configuration, the installation may differ from the description below. Details are available in document P-044-0001.

☞ The glue station can only be installed on the right side of the Y module on a MY100 machine.

Procedure

1. Find the 26 pole, female header, flat XMF cable in the cable duct of the slot where the glue station is to be placed.

   Only magazine slots on the right side of the Y wagon can be used for a glue station.
2. Place the cable in the cable duct so that the free end comes up over the rear of the magazine slot cover.
3. Place the glue station in the magazine slot.
4. Connect the XMF cable coming up behind the slot to the XMF3 cable connector in the glue station. This cable is found at the front.

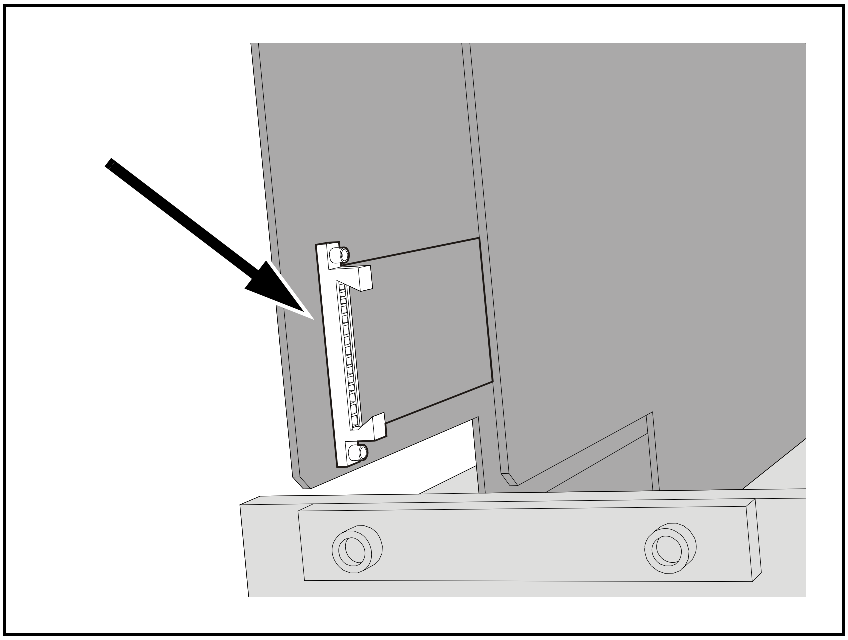


Figure 14-4. XFM3 cable.

5. Perform the TPSys installation procedure and calibrations according to the TPSys installation guide.

Removal of glue station

Refer to installation procedure in reverse order.

15. Safety System

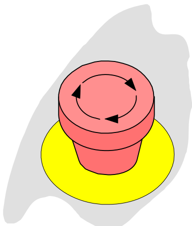
This chapter contains a description of the safety system in a MY100 machine. There is also a description of a functional test that displays the status of the emergency stop buttons and hood switches.

The safety system chapter comprises the following sections:

System Description

The safety system on the MY100 machine is an electrically controlled system. It consists of relays, emergency stop buttons, hood switches for X and Y, and supervising circuitry in the Y-box and X-box. All parts of the electrical safety system are doubled, and the system is designed to guarantee the safety function even at any single electrical failure in the system. The machine continuously monitors the majority of the components in the safety system, and if any faults are detected the machine will stop with an error message. Consequently if there is a failure like a short circuit, a welded relay or a loose cable, the safety system will still be fully operational, but the machine will not run.

Emergency Stop Buttons



The emergency stop button ('A' in Figure 15-1) is located in the center of the machine close to the keyboard. The emergency stop button is red and has a yellow ring at the base. A pressed emergency stop button is released by rotating the button clockwise.

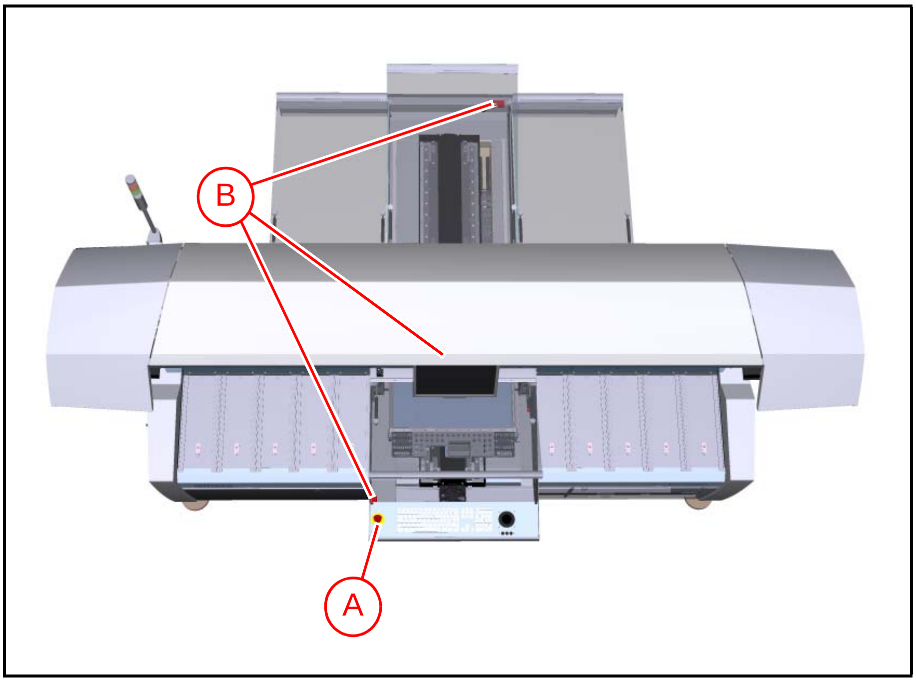


Figure 15-1. Safety switches.

Emergency stop buttons on accessories

Emergency stop buttons on MYDATA accessories such as TEX (Tray Exchanger), TWM (Tray Wagon Magazine) and conveyor system, all have the same function, that is to switch all motors off and release movable machine elements. Besides this the X and Y servos will actively stop any X and Y movements as fast as possible.

Also the power available to the motors in the internal conveyor is reduced to a safe level. This is for the machine to still be able to hold a clamped board.

WARNING! The emergency stop button must always be pressed down when hands, fingers, tools or other objects are within a shielded area or in the danger area of movable machine elements such as the X wagon or Tray Wagon Magazine.

External Emergency Stop Button (Optional)

One optional emergency stop button with MYDATA part number L-059-0121 may be connected to the AUX EMERG connector in the Y-box. The function and operation of the optional emergency stop button is identical to the one mentioned above.

Restart

To restart the machine after an emergency button has been released, enter a command on the keyboard.

Cover and Hood Switches

The upper hood covering the X movement and the front and rear hoods covering the Y movement all have safety switches ('B' in Figure 15-1).

If any of the switches at the X-wagon covers is activated, in other words if a cover is opened, the X-wagon safety relay stops the X movement immediately.

The switches use special keys to make them difficult to manipulate.

Electrical System

Schematics

All schematics regarding this machine can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

Functional Test

This section describes how the status of the safety system can be monitored and tested. This function is very useful to test and verify that the safety system is working properly. This test should always be performed if any service has been made to the safety system.

The following two test are available on the safety system.

– *Monitoring the Safety System* on page 15-4.

– *Testing the Safety System* on page 15-4.

NOTE! The machine must be set in operation, that is the X and/or Y-movement system must be in motion to accurately test the safety system. This is to ensure that the safety relays really engages and thereby stops the X and/or Y-movement when a emergency stop button is pressed or a hood or cover is opened during operation.

The safety system electronics automatically monitors the following three aspects of the system:

– The status of all switches are monitored for informative purposes.

– The status of the power relays for the X and Y movements is monitored.

– The overall integrity of all switches and buttons.

The monitoring tasks of the X and Y system electronics are divided as follows:

Monitored by the Y system electronics

– Status of front and rear Y hood switches.

– Status of the optional external emergency stop button.

– The status of the Y movement power relays.

Monitored by the X system electronics

– Status of emergency stop button.

– Status of X hood switch.

– The status of the X movement power relays.

– The overall integrity of all switches and buttons.

Monitoring the Safety System

All signals mentioned above can be viewed in the *CanX Board Test* and *CanY (YMB2) Board Test* respectively. These options are only available in the extended service program.

NOTE! This test only shows the status of the safety switches. To test that the safety system is working properly and stops all machine movement, perform the test described in section *Testing the Safety System* on page 15-4.

The following procedure describes how to monitor and test the safety system.

1. Select *Exit* > *Exit To Service* from the TPSys main menu.
2. To see the current state of the safety sensors, select *Motor* > *Show/Hide safety switches*.
3. All safety signals are shown in the *Safety sensors* information box. See Figure 15-2.

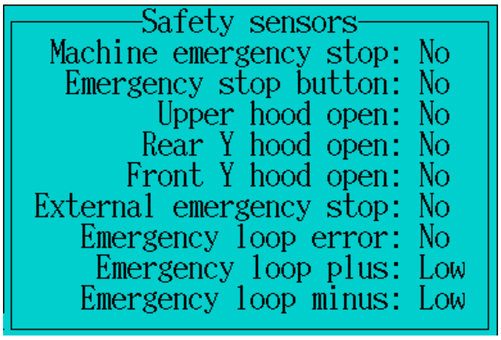


Figure 15-2. Safety sensors information box.

4. Test the hood switches by opening and shutting all covers and hoods (one at a time) on the machine.

   Verify that the system indicates when a cover or hood is open or closed.
5. Test the *Machine emergency stop button* by pressing the emergency stop button on the machine.

   Verify that the system indicates that the emergency stop button is activated.
6. If present, test the *External emergency stop button* as described in the previous step.
7. When done, close all hoods and covers and release the emergency stop button(s).
8. Press <Esc> to leave the dialog box.

Testing the Safety System

The following procedure describes how to test the safety system.

Before performing this test the machine must be set in operation, that is the X and/or Y-movement system must be in motion to accurately test the safety system.

1. If your are in TPSys, start the service program by selecting *Exit* > *Exit To Service*.
2. Start one of the motors, X motor or Y motor by selecting *X motor* or *Y motor* > *Initiate*
3. While the machine is moving, test the hood switches by opening and shutting all covers and hoods (one at a time) on the machine.

   Verify that the machine comes to a complete stop when a cover or hood is opened.
4. To test another hood switch, perform step 2 and 3 again.
5. While the machine is moving, test the *Machine emergency stop button* by pressing the emergency stop button on the machine.

   Verify that the machine comes to a complete stop when the emergency stop button is activated.
6. If present, test the *External emergency stop button* as described in the previous step.
7. When done, close all hoods and covers and release the emergency stop button(s).
8. Press <Esc> to leave the dialog box.

16. Maintenance

This document informs about preventive maintenance for the MY100 machine types. This maintenance should be performed at stated intervals.

The warranty on the machine and parts applies only if these instructions are followed.

Use only authorized parts, to keep original level of machine safety. Any damage or malfunction caused by the use of unauthorized parts is not covered by warranty or product liability. Improper maintenance, deficient installation and not verified products can lead to serious defects and early loss off system performance. In case of an incident, the use of not original products and spare parts has wide-ranging legal effects including the expiration of the national and international type approvals.

The maintenance tasks in this chapter shall only be performed by an authorized maintenance engineer.

Maintenance Intervals

– The intervals for daily maintenance are fixed and should be performed by the machine operator. Refer to the Operator's manual for details.

– The maintenance intervals specified at 160 hours running time and 2000 hours running time are dependent on the usage of the machine. The running times mentioned above are based on an eight hour working day, seven days a week.

  This type of maintenance should be performed by an authorized maintenance engineer.

CAUTION! The maintenance intervals apply to a clean environment and an indoor temperature of maximum 25 °C. If operated in a dusty environment, or higher temperature, it is strongly recommended to perform cleaning and lubrication after half the stated time intervals.

This Chapter is divided in the following sections.

Cleaning Optics

- If an optical surface is very dusty or dirty, remove the dust and dirt using a spray can with clean air **intended for optics**. Other air may contain particles and grease from air pumps and valves which may be harmful to the optics.
- Clean optics by folding a clean lint-free cloth to the width of the optics. Apply a small amount of **isoprophyl** alcohol, and gently pass the cloth over the surface. Ensure there is no film left on the surface after the use of alcohol. An alternative is to use pre-moistened cleaning towlettes, especially developed for cleaning of optics.
- For cleaning of the linear scale and optics use isoprophyl alcohol sparingly with a wetted lint-free cloth. Other solvents could damage the equipment.
- Do not use abrasives or cleaning solutions!

Lubricants

Unless otherwise stated, use Shell Tellus Oil 32 and Omega 28 grease. Oil and grease should be applied to give just a thin film.

Information about Material Safety are found on http://www.mydata.com and in Chapter 1.

Spare parts

Part numbers for spare parts are found on the MYDATA web site: http://www.mydata.com. User name and password may be needed.

Maintenance Overview

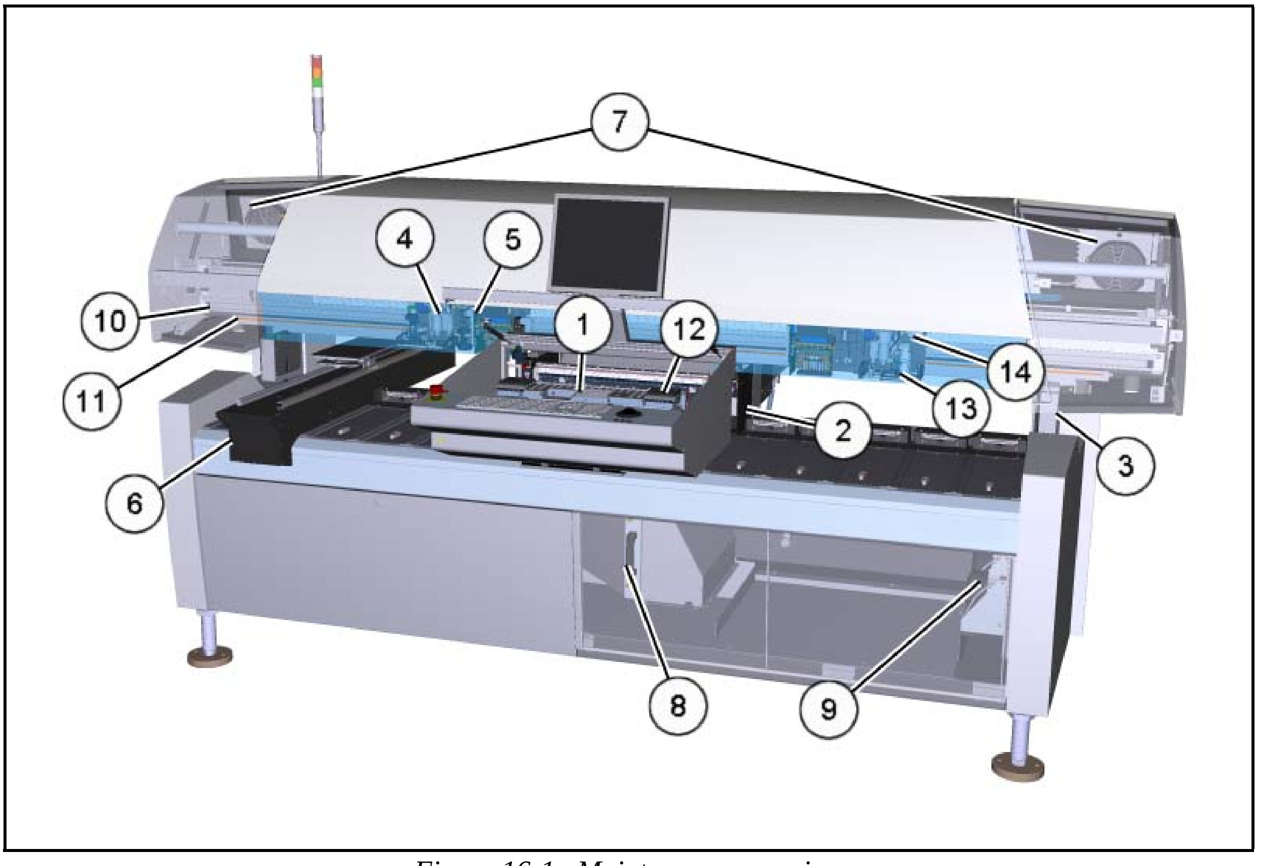


Figure 16-1. Maintenance overview

Figure 16-1 shows all units involved when performing the maintenance routines. The following units are involved in the maintenance tasks.

1. Midas mount tools.
2. LSC (Linescan camera).
3. DVC (Dual Vision Camera).
4. Midas mount head.
5. HYDRA mount head.
6. Tray Wagon Magazine.
7. Top cover fan filters.
8. Electronic shelf filter.
9. Vacuum pump filter.
10. X-beam guiding rails.
11. X-beam linear scale.
12. HYDRA mount tools.
13. Mechanical centering unit.
14. Midas vacuum filter.

Requirements

The following equipment is needed when performing the maintenance tasks.

Tools

- Standard tools.
- Torx keys.
- Allen keys (metric).
- Vacuum cleaner and/or short-bristled brush.
- Grease gun.

Consumables

- Isoprophyl alcohol.
- Lint-free cloths.
- Lint-free cotton wool buds (Q-tip's).
- Collecting container for rejected components.

Lubricants

- OKS 270 grease, optionally Omega 28 grease.
- Shell Tellus Oil 32.
- HYDRAULIC OIL (K-012-0085).
- GREASE PARALIQ GA 351, 25G (K-012-0122B).
- Gleitmo 585 K grease.
- THK AFJ grease (K-022-0057).

Preparation

Before commencing any maintenance, it is recommended to make a backup of the databases in TPSys.

Refer to the TPSys software manual about backing up data and parameters.

Calibration

Many of the maintenance procedures described in this section will require that the machine needs to be re-calibrated. Refer to Chapter *4 Installation and Calibration* for further instructions.

Monthly or 160 Hours Maintenance

The following areas are covered by the monthly or 160 hours maintenance routines.

– *Clean and Lubricate Midas Tools* on page 16-6.
– *Preserve DVC (Dual Vision Camera)* on page 16-7.
– *Preserve LSC (LineScan Camera)* on page 16-8.
– *Preserve HC2 (HYDRA Camera 2)* on page 16-9.
– *Clean and Lubricate Mechanical Centering Unit* on page 16-10.
– *Clean and Lubricate Midas Mount Head* on page 16-11.
– *Clean and Lubricate Midas II Mount Head* on page 16-12.
– *Clean the HYDRA Reference Background* on page 16-13.
– *Clean and Lubricate HYDRA Vacuum Tubes* on page 16-14.
– *Clean and Lubricate HYDRA Tool Tubes* on page 16-16.
– *Preserve HYDRA Mount Tools* on page 16-19.
– *Clean and Lubricate Tray Wagon Magazine* on page 16-20.
– *Replace Midas Vacuum Filter* on page 16-21.
– *Preserve Linear Scales* on page 16-22.
– *Preserve LCD Screen and Warning Signs* on page 16-23.

WARNING! Before commencing, press the emergency stop button down.

Clean and Lubricate Midas Tools

1. Check spring-loaded tools by gently pressing the tubes to the end position. When the tubes are released, make sure they return to the original positions. **Be careful not to overload the springs.**
2. Lubricate metal colored spring-loaded tools with a drop of Shell Tellus Oil 32, see Figure 16-2.

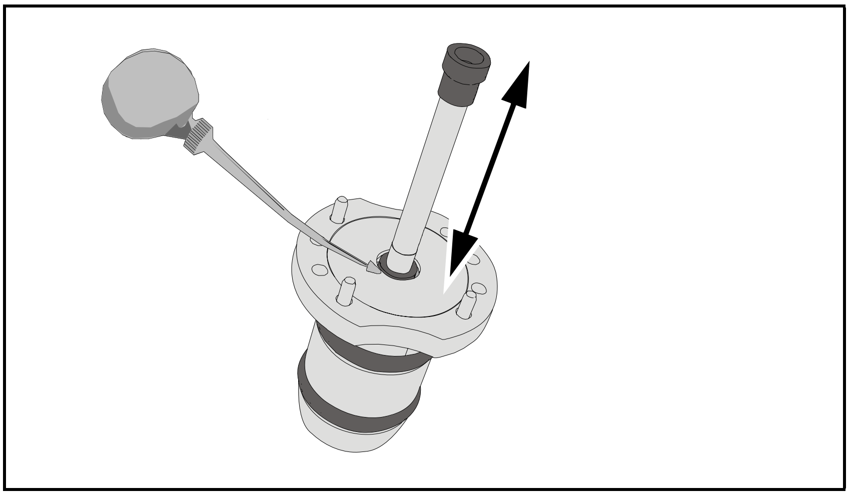


Figure 16-2. Spring loaded tools lubrication.

Do not lubricate any tools with a black housing.

3. Inspect O-rings for cracks or abrasions. Replace if necessary. Part numbers are found in the *Spare Parts Catalog*.

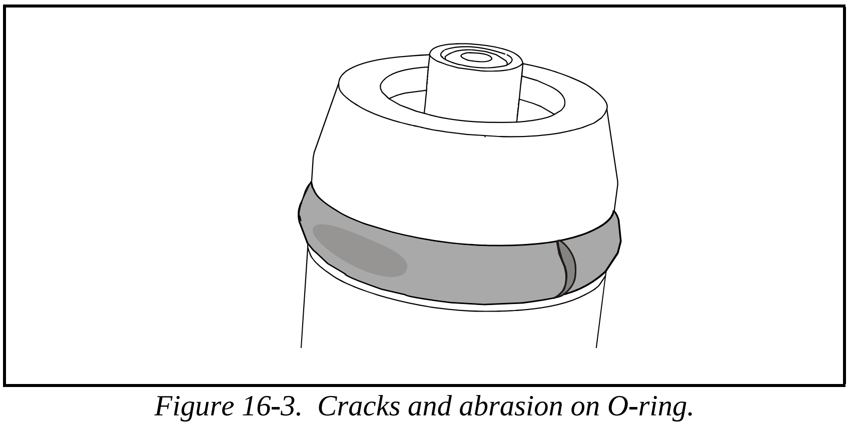


Figure 16-3. Cracks and abrasion on O-ring.

4. Clean and lubricate mount-head tool O-rings with Omega 28 grease. Apply only a thin layer of grease on the O-rings.

Preserve DVC (Dual Vision Camera)

1. Empty the DVS camera dump bin.

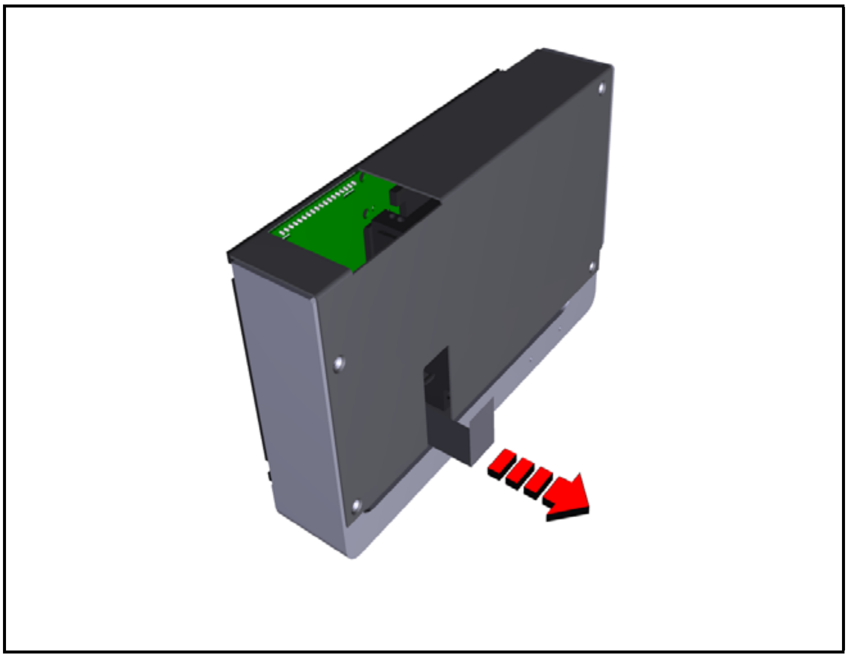


Figure 16-4. DVS camera dump bin.

2. Clean the outer mirror (at the arrow in Figure 16-5) accessible without opening the camera cabinet.

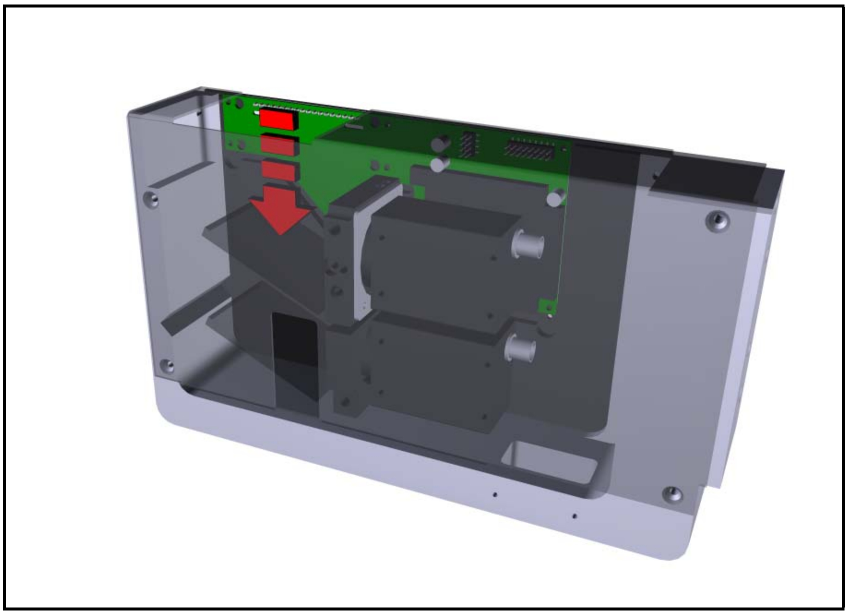


Figure 16-5. Dual vision camera outer mirror.

Preserve LSC (LineScan Camera)

1. Remove dropped components from the Linescan camera glass by withdrawing it at the front of the camera box, see Figure 16-6.

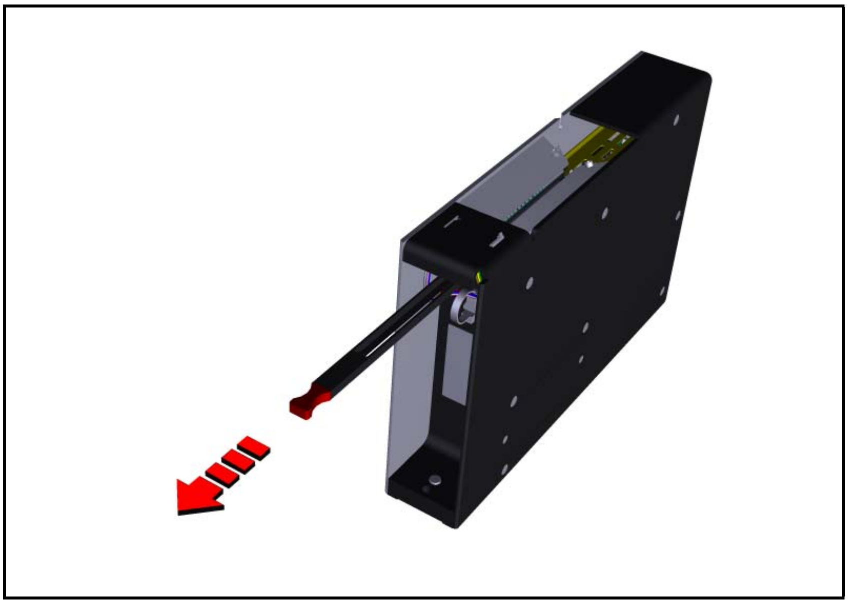


Figure 16-6. Removing Linescan camera glass.

2. Clean the Linescan camera glass.

Be careful not to push the camera glass too far back when re-inserting it in the Linescan camera.

Preserve HC2 (HYDRA Camera 2)

1. Pull the lever ('1' in Figure 16-7) in the front and any components on the transparent gate will fall down to the bottom of the camera into a dump bin ('2') and can then easily be removed.
2. Remove dropped components from the camera body, preferably with a vacuum cleaner.

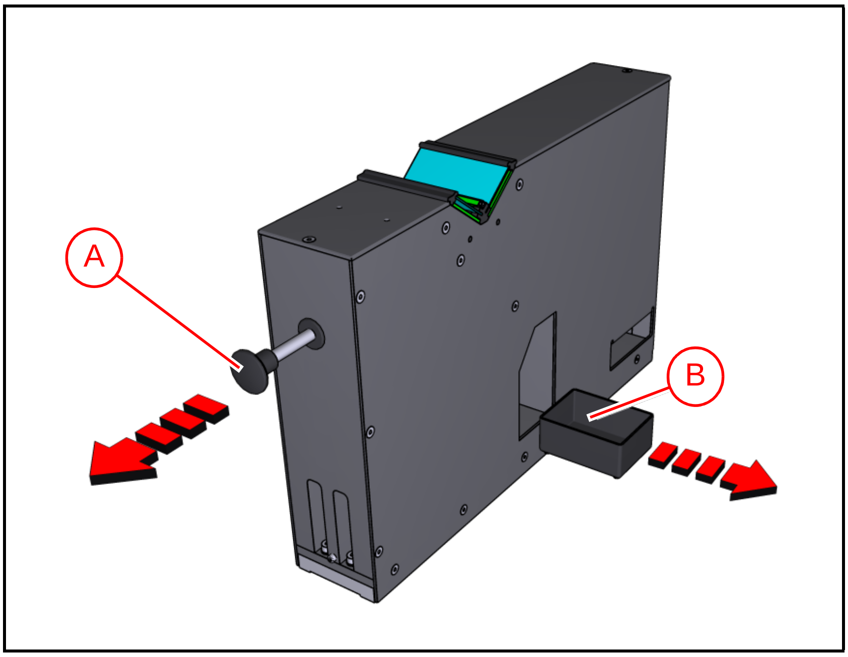


Figure 16-7. HYDRA camera dump bins.

3. Clean the HYDRA camera glass (see arrow in Figure 16-8).

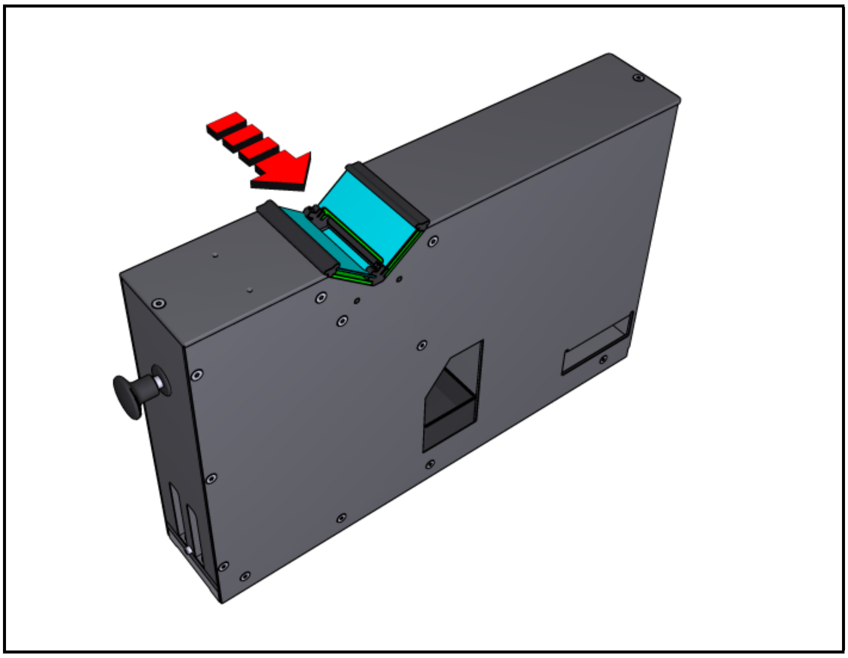


Figure 16-8. Camera glass, HYDRA camera.

Clean and Lubricate Mechanical Centering Unit

1. Using a Q-tip slightly wet in alcohol, clean the centering jaws ('A' in Figure 16-9).

2. Inspect the electrodes ('A') and the termination wires ('B'). Are the electrodes pitted (that is full of dents after components), worn, or the wires are damaged, the centering jaws must be replaced and calibrated. Refer to Chapter 8 for details. Part numbers are found in the *Spare Parts Catalog*.

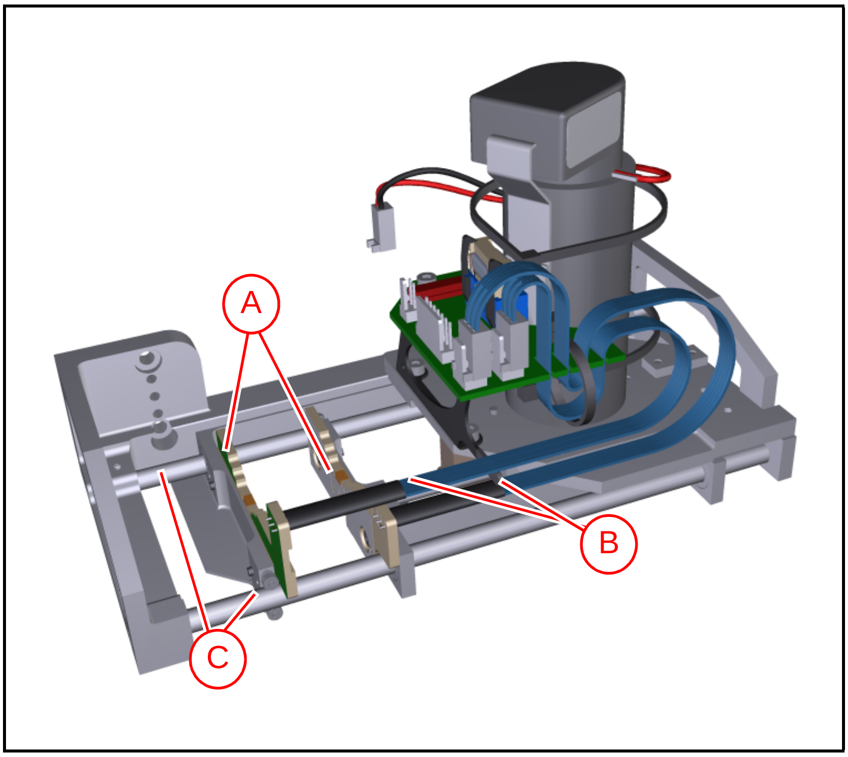


Figure 16-9. Centering unit electrodes and axles.

3. Wipe the mechanical centering unit axles ('C') with a lint-free cloth and lubricate them with Shell Tellus Oil 32. Make sure that the Linescan reference background is not contaminated with oil. If so, wipe of the Linescan background with a lint-free cloth slightly dampened with alcohol.

Clean and Lubricate Midas Mount Head

1. Clean dirt and dust out with a Q-tip from the inside of the tool head ('A' in Figure 16-10). Be careful not to damage the force sensor inside the tool head.
2. Lubricate the inside of the tool head ('A') by inserting and removing a greased tool manually.
3. Wipe off old grease and dirt from the Z rack ('B') with a cloth and apply a new thin layer of OKS 270 grease. Apply the grease on both the front and the back of the Z rack.

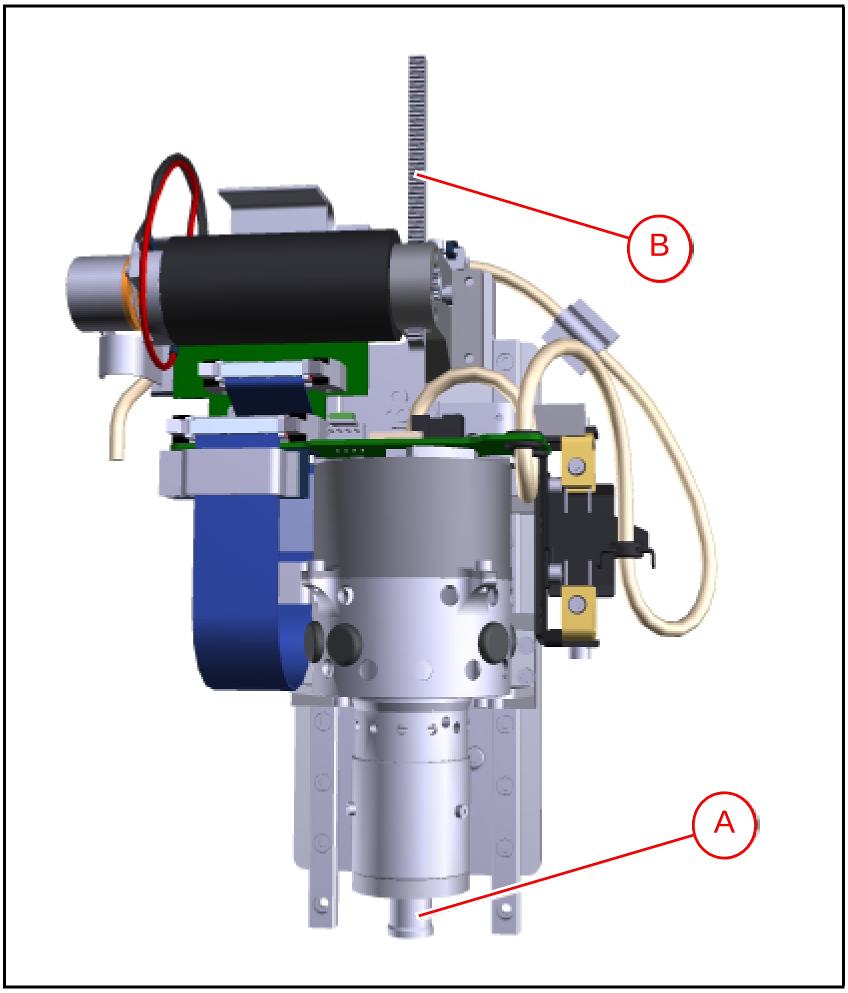


Figure 16-10. Midas mount head, Z rack and tool head position.

Clean and Lubricate Midas II Mount Head

1. Manually move the Midas Z unit to its upper position.
2. Use a lint-free cloth to wipe off old grease and dirt from the Z rack ('A' in Figure 16-11) and apply a new thin layer of OKS 270 grease. Apply the grease on both the front and the back of the Z rack.

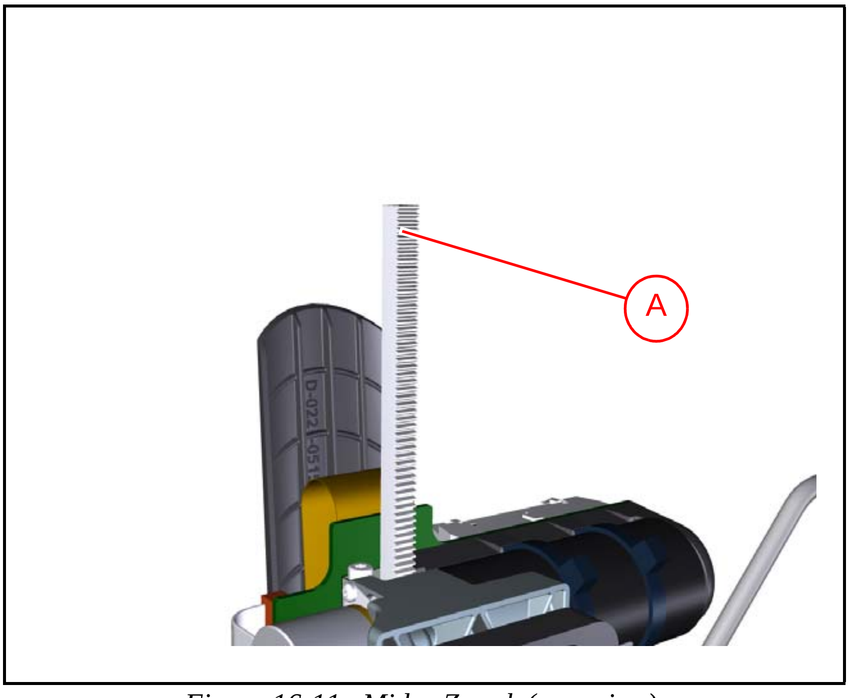


Figure 16-11. Midas Z rack (rear view).

3. Use a lint-free cloth to wipe off old grease and dirt from the Z-unit linear guides ('A' in Figure 16-12) and apply a new thin layer of THK AFJ grease. Manually move the Z unit up and down a few times to disperse the grease evenly.

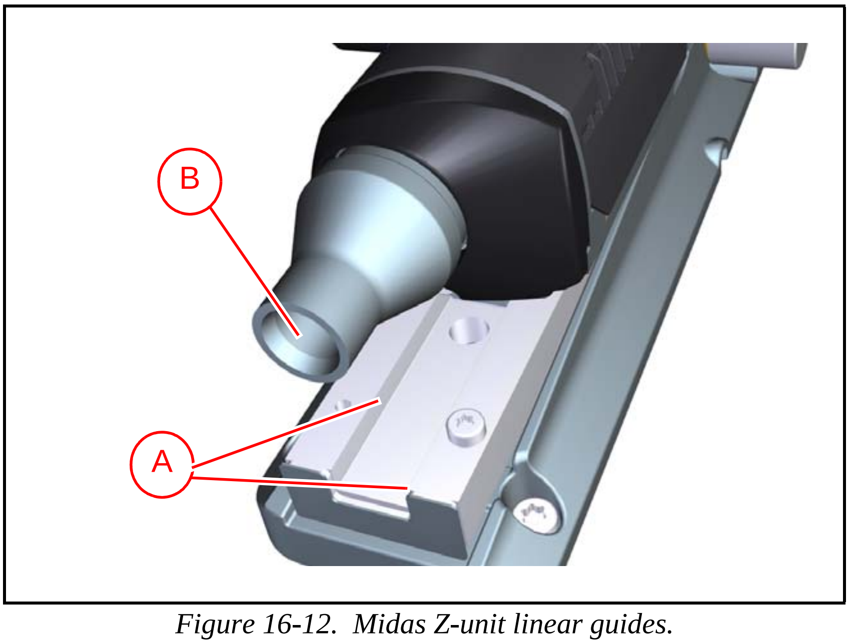


Figure 16-12. Midas Z-unit linear guides.

4. Lubricate the inside of the tool head ('B') by inserting and removing a greased tool manually.

Clean the HYDRA Reference Background

- Wipe off the reference background (see Figure 16-13) on the HYDRA unit with a cloth.

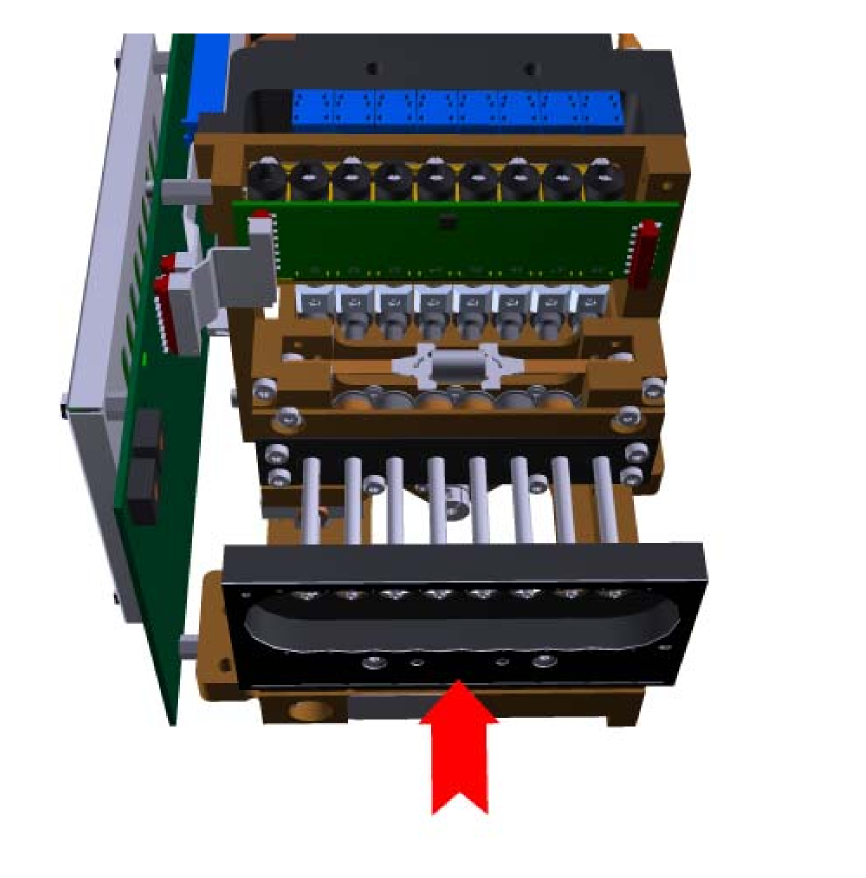


Figure 16-13. Clean reference background.

Clean and Lubricate HYDRA Vacuum Tubes

1. Before performing the next step the machine must be turned off or the HYDRA needs to be passivated.

To passivate the HYDRA, select *Head* > *HYDRA* or *HYDRA2* > *Passivate*

If the power to the HYDRA is on and HZ wagon is not passivated then the HYDCB board may be damaged if the HZ wagon is forced down manually

2. Gently push the HZ wagon down against the reference background and hold the HZ wagon in this position while continuing with the next step, see Figure 16-14.

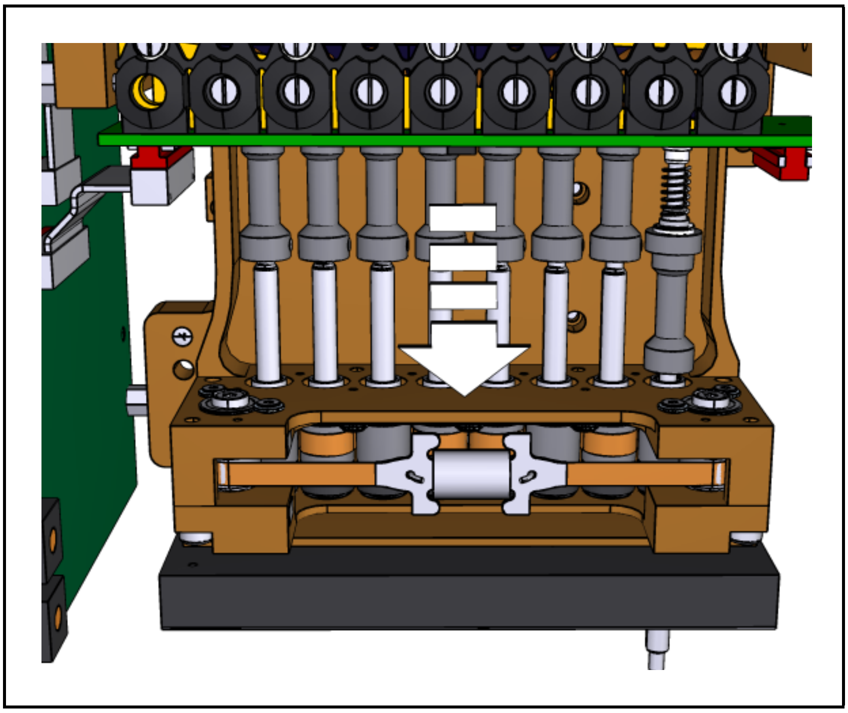


Figure 16-14. Lower HZ wagon.

3. Use a Q-tip to clean and lubricate (K-012-0085 HYDRAULIC OIL) the vacuum tubes, see Figure 16-15. Make sure the vacuum tube is clean before applying oil.

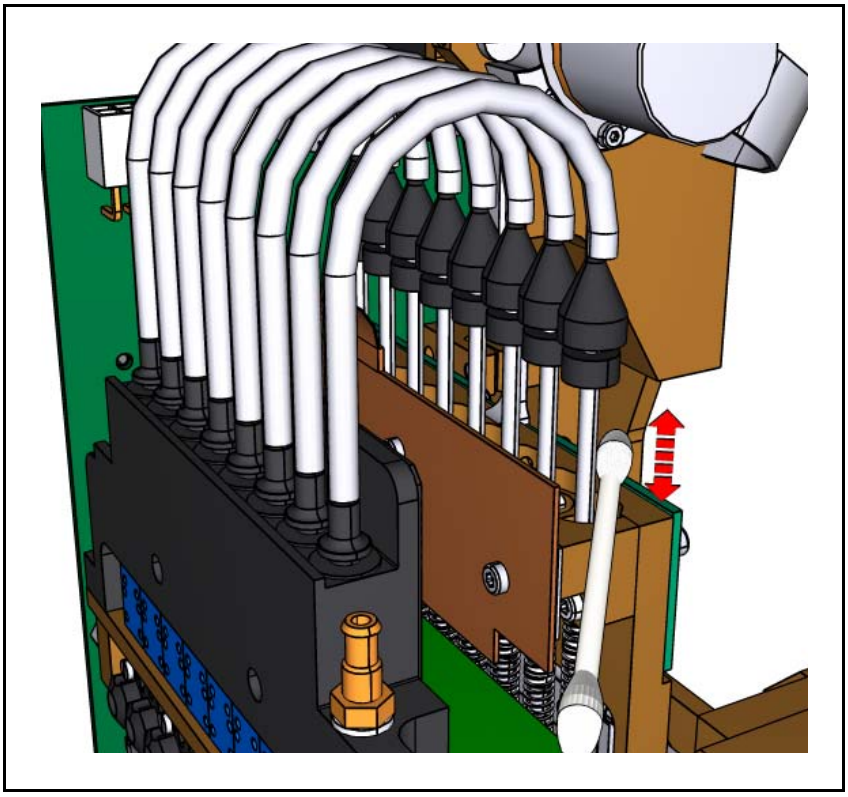


Figure 16-15. Lubricate vacuum tube.

Clean and Lubricate HYDRA Tool Tubes

1. Use a Q-tip to clean and lubricate (K-012-0122B GREASE PARALIQ GA 351, 25G) the tool tubes. Be sure to lubricate the vertical recesses in the tool tubes, see Figure 16-16.

   Note that there are two recesses in each tool tube.

2. To disperse the grease evenly over the tool tubes, move the HZ wagon up and down a few times.

3. Remove any excessive grease.

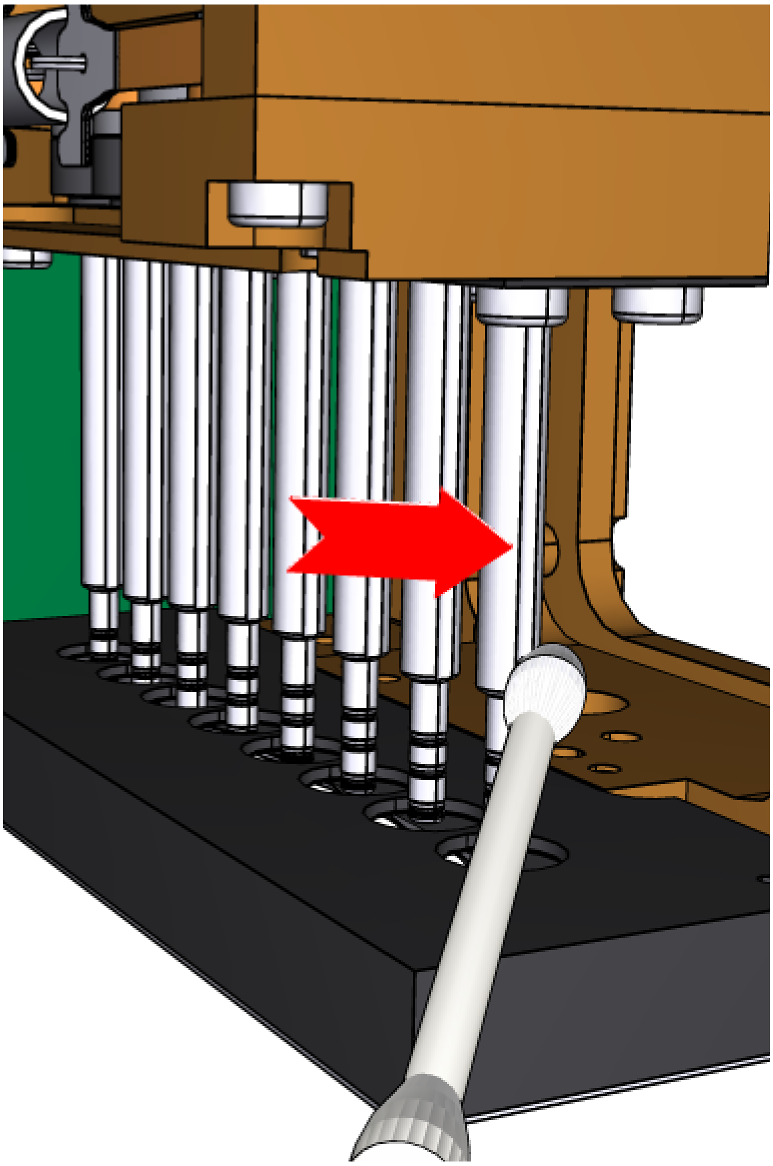


Figure 16-16. Lubricate tool tube.

4. To check the friction on a tool tube after lubrication, release the tool tube by pulling the latch out, see Figure 16-17. Continue with the next step.

To reduce the risk of damaging the tool tubes, hold a hand/finger under the HYDRA to catch the tool tube when it is released.

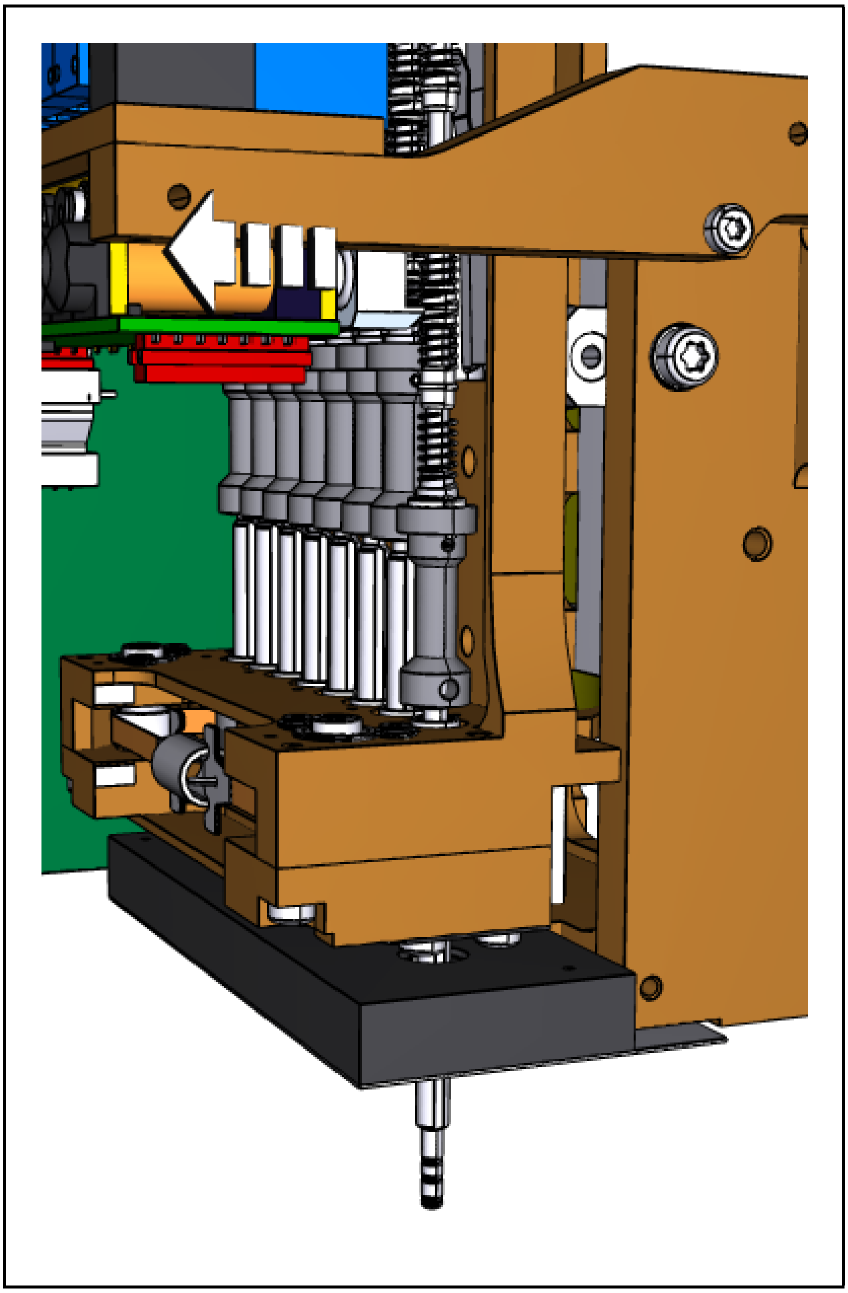


Figure 16-17. Release tool tube.

5. When the tool tube is released and in its lower position, use a finger to rapidly push the tool tube up and down to make sure that the tool tube moves freely and with an even motion, see Figure 16-18.

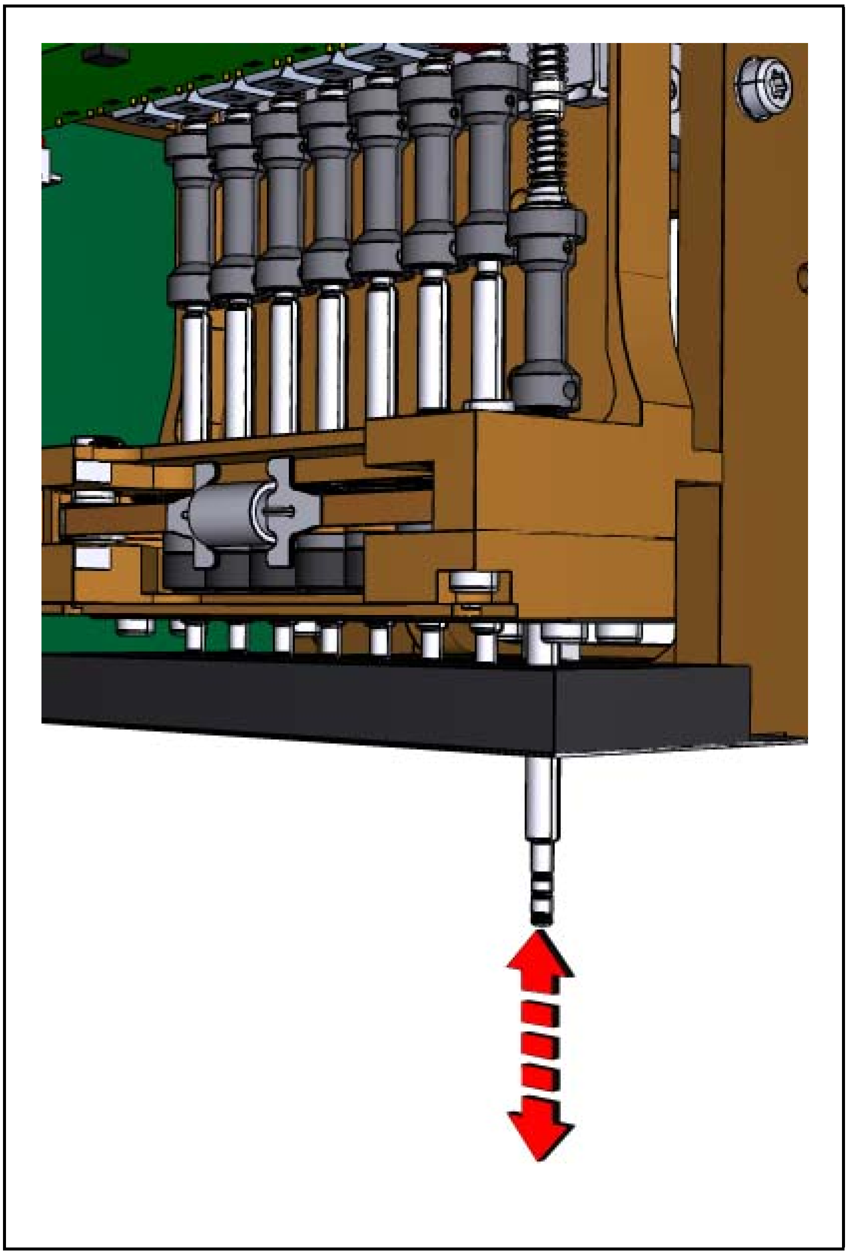


Figure 16-18. Check friction on tool tube.

6. Perform the procedure above to check all tool tubes.

Preserve HYDRA Mount Tools

Remove the tools manually. Instructions on how to remove tools are found the in Operators Manual.

1. Remove the H01 – H06 tools and inspect their tips for cracks, dents and wear under a magnifier or pocket lens. Replace damaged tools if necessary.

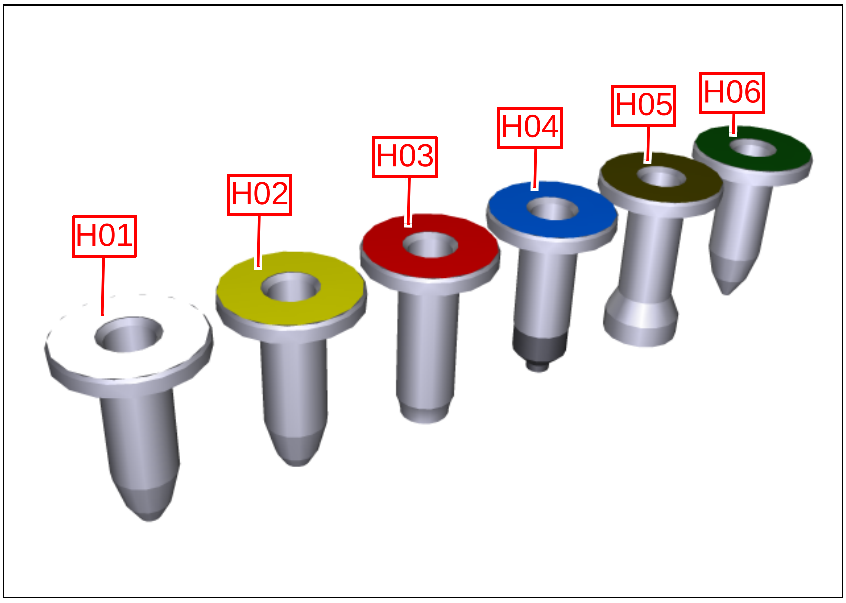


Figure 16-19. HYDRA *mount tools.*

Check that the tools are planar. If edges are rounded – replace the tool.

2. Remove the H04 (blue tools) (see Figure 16-19) and inspect the rubber tips under a magnifier or pocket lens for cracks or abrasions. Replace tip if necessary.

Check the rubber tip container for expiration date. Do not use expired rubber tips.

3. Check that no small components have fallen into the tools when they are placed in the ATE tool holder.

Clean and Lubricate Tray Wagon Magazine

- Clean and wipe off the Tray Magazine rod with a cloth slightly oiled with Shell Tellus Oil 32. See Figure 16-20.

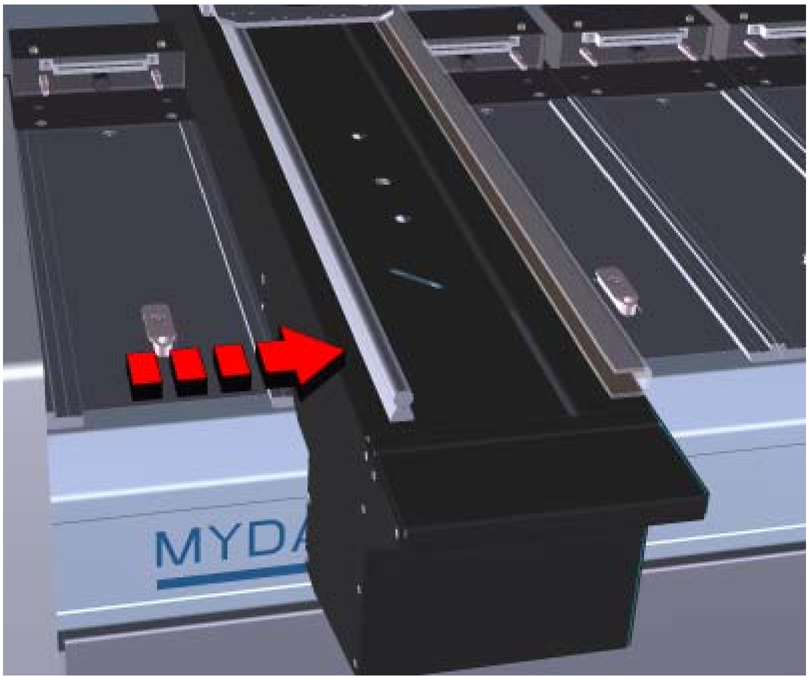


Figure 16-20. Tray Wagon Magazine rod.

Replace Midas Vacuum Filter

1. Check the vacuum system as described in Chapter 10 *Pneumatic System*.
2. Inspect all vacuum hoses for cracks or abrasions. Replace if necessary. Part numbers are found in the *Spare Parts Catalog*.
3. Replace the Midas vacuum filter ('A' in Figure 16-21). Pull out the nipple ('B'), and use a pair of tweezers to remove the old filter. Part numbers are found in the *Spare Parts Catalog*.

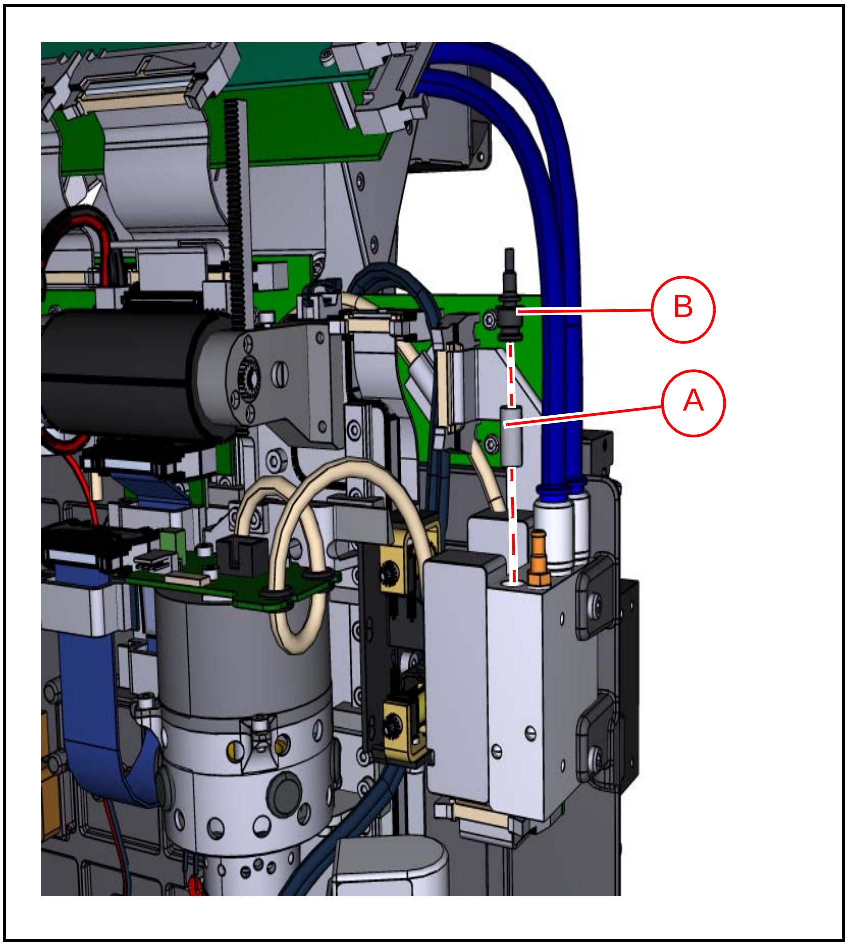


Figure 16-21. Removing the Midas vacuum filter.

Preserve Linear Scales

1. Wipe off the Y-linear scale using an isoprophyl alcohol wetted lint-free cloth. Other solvents could damage the equipment. Be careful not to scratch or damage the surface.

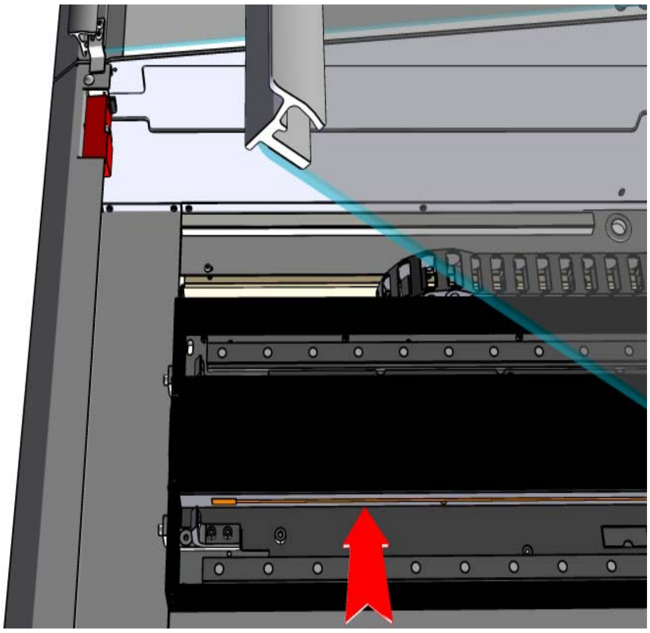


Figure 16-22. Y linear scale.

2. Wipe off the X-linear scale using an isoprophyl alcohol wetted lint-free cloth. Other solvents could damage the equipment. Be careful not to scratch or damage the surface.

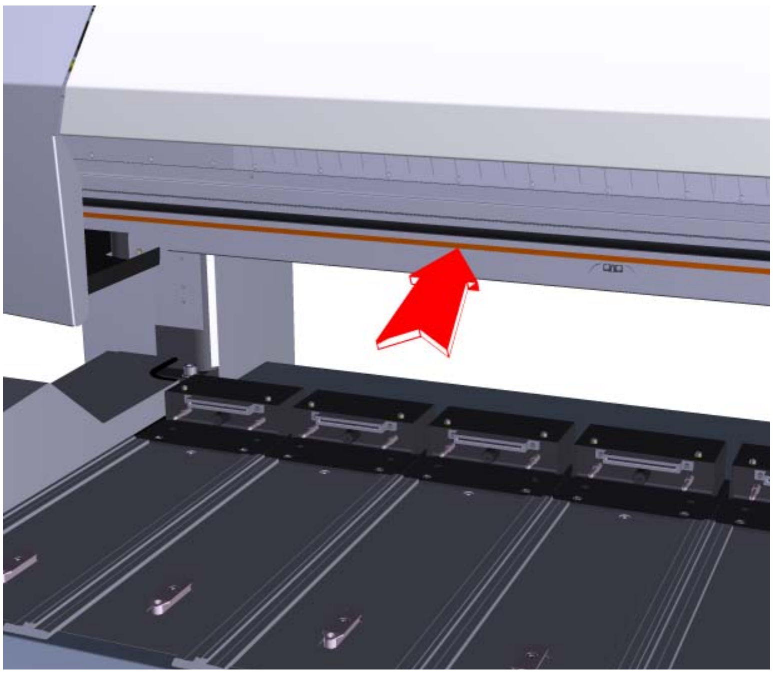


Figure 16-23. X linear scale.

Preserve LCD Screen and Warning Signs

LCD screen

- Wipe off the screen if needed. Use a soft cloth and dampen the cloth slightly with clean water.

Do not use abrasives or cleaning solutions!

Warning signs

- Warning signs on the machine must be clean and readable. If needed, clean or replace the signs (refer to the *MY100 Operator's Manual*).

Yearly or 2000 Hours Maintenance

The maintenance tasks in this section shall only be performed by an authorized maintenance engineer.

Please contact your MYDATA service department to arrange for a visit by a MYDATA field service engineer.

This section describes the following maintenance tasks:

Replace Top Cover Fan Filters

1. Open the upper top hood by gently pressing a pointed object, for example an M6 Allen key through the holes and releasing the lock on each side of the upper hood. See Figure 16-24.

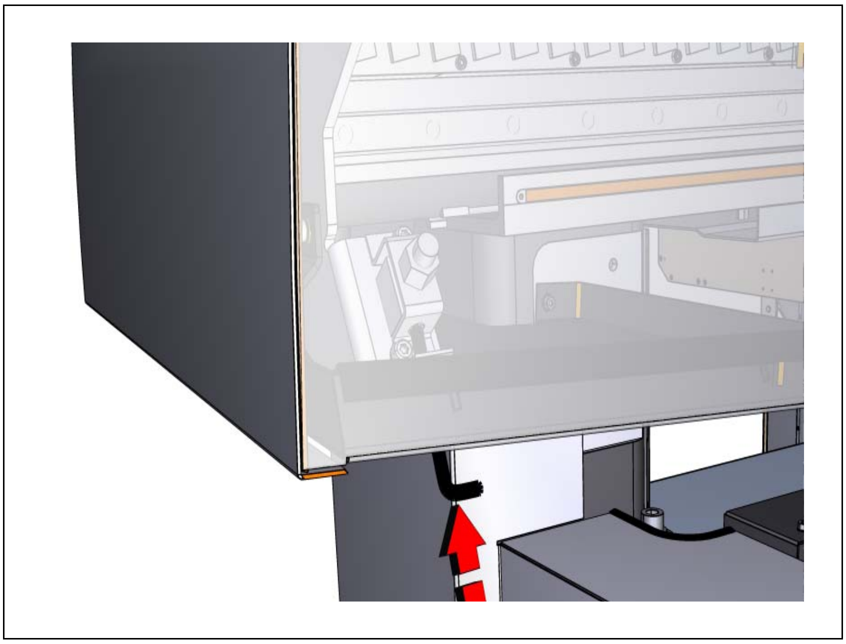


Figure 16-24. Opening the top hood.

2. The fan assemblies are located under the top cover on the rear cover.
3. Use a large slotted screwdriver to turn the black plastic screw holding the fan assembly in place (see Figure 16-25).

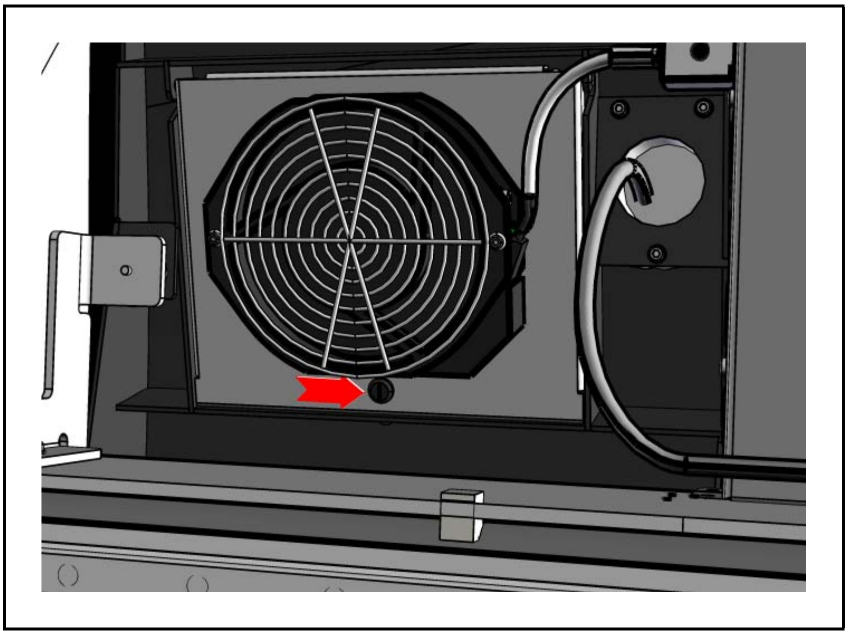


Figure 16-25. Fan assembly.

4. Unhook the fan assembly from the rear hood.
5. Replace the filter mat.
6. Repeat steps 3 to 5 on the other fan assembly.

Replace Electronic Shelf Filter

1. The electronic shelf fan assembly is located behind the lower right cover of the machine.

   The lower left front cover has to be removed before the lower right cover can be removed.

2. Turn the two locks ('A' in Figure 16-26) on the filter cassette one quarter of a turn to unlock the cassette with the filter mat ('B').

3. Pull the cassette with the filter mat straight out from the fan unit.

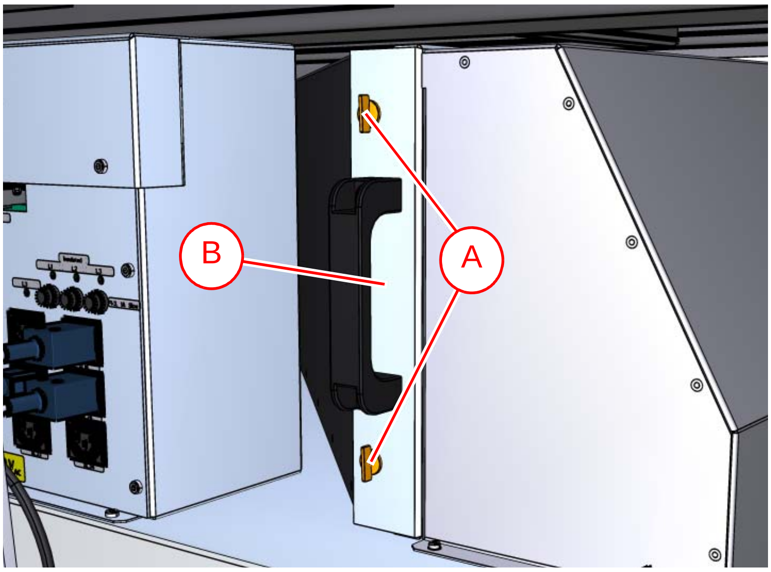


Figure 16-26. Fan assembly.

4. Replace the filter mat ('A') in the filter casette ('B').

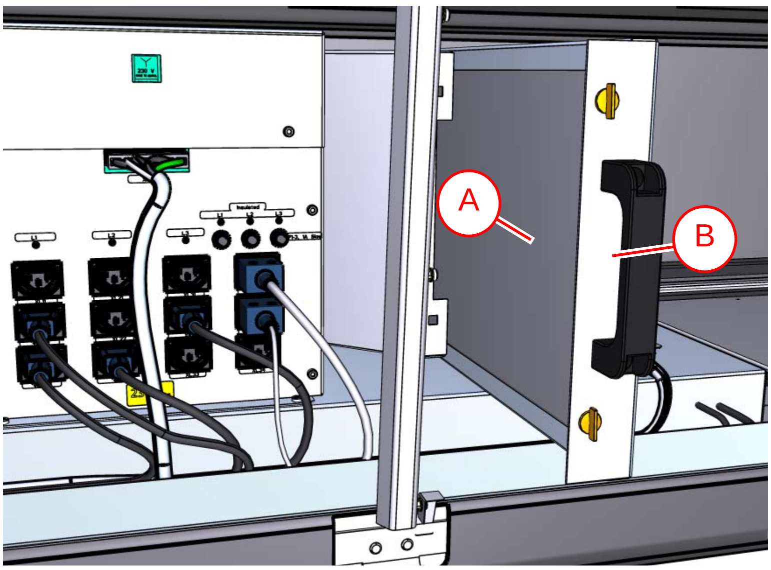


Figure 16-27. Fan assembly.

5. Re-assemble the filter assembly.

Replace Front Hood Fan Filter

1. The conveyor front hood fan assembly is located at the bottom of the conveyor's front hood.
2. Carefully remove the plastic cover ('C' in Figure 16-28) from the fan assembly ('A').
3. Replace the filter mat ('B').

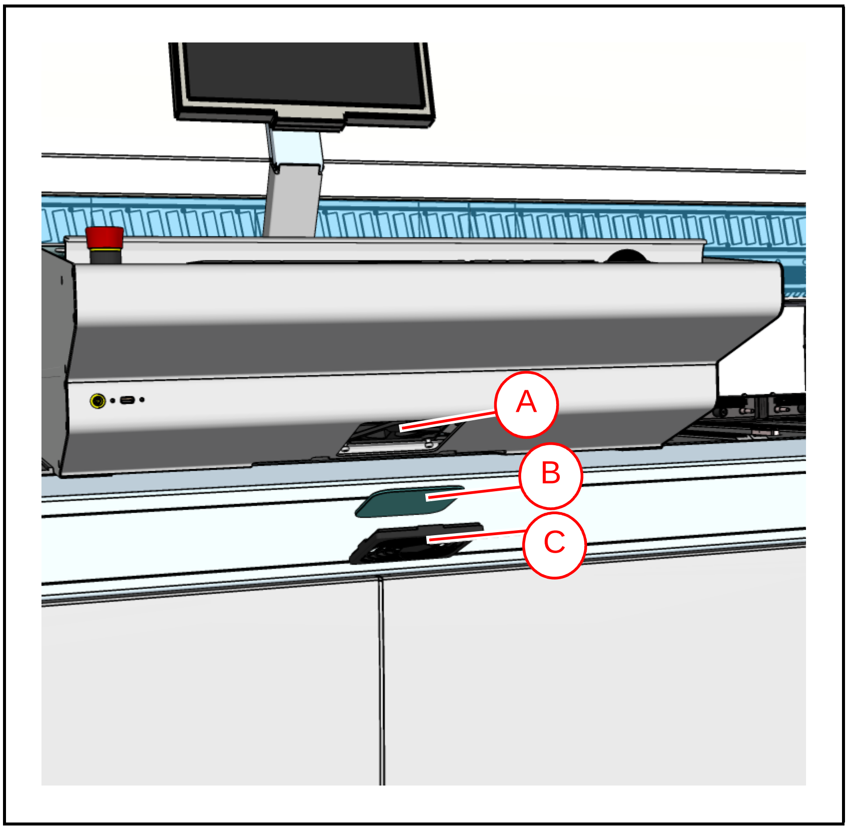


Figure 16-28. Replace filter mat.

4. Re-assemble the filter assembly.

Replace Vacuum Pump Filter

1. The vacuum pumps are located behind the right side cover of the machine.

   Remove the right side cover.

2. Use a spanner to loosen and remove the bolt holding the filter (see Figure 16-29) in the vacuum pump assembly.

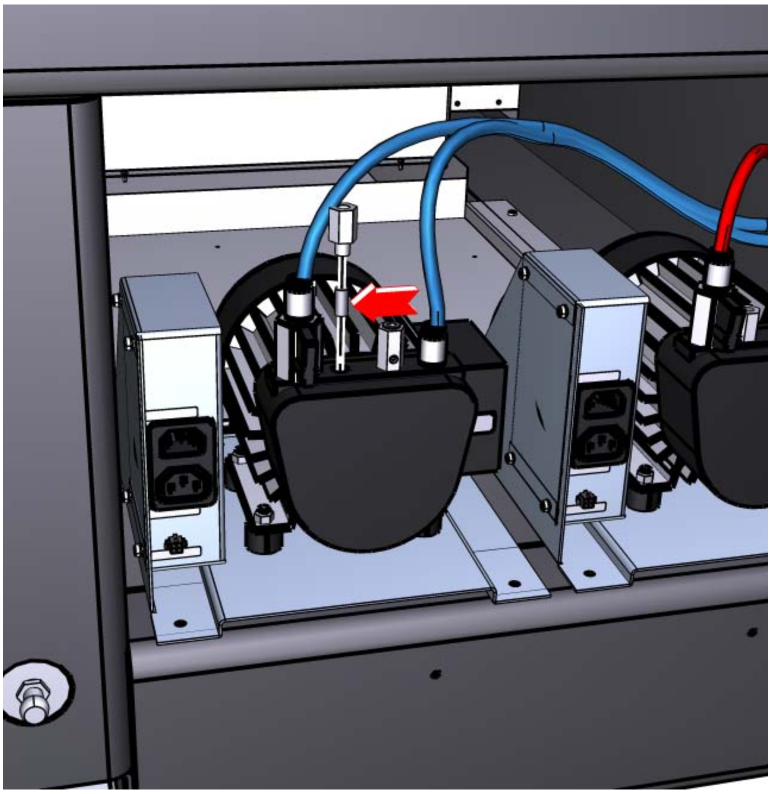


Figure 16-29. Replace vacuum filters.

3. Use a pair of tweezers to remove the filter from the pump housing.
4. Replace the filter and re-attach the bolt.
5. Repeat the procedure above on the other pump unit (MY100DX).

Preserve Midas and HYDRA Tool Bank

1. Wipe off any solder paste and glue from the tip of the mount tools carefully with a cloth slightly wet in alcohol. Be careful not to damage the springs in spring-loaded tools.

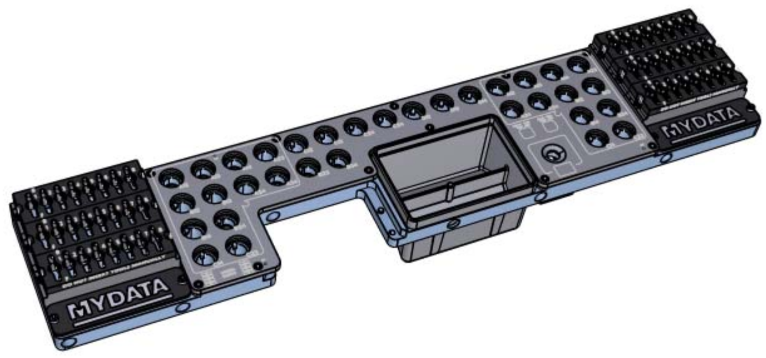


Figure 16-30. Midas and HYDRA tool banks (MY100DX).

Be careful to put the tools back in their original position in the tool bank.

---

2. Check that no small components have dropped into the tool banks, if so use a vacuum cleaner to remove the components.
3. Wipe off the tool bank with a cloth slightly wet in alcohol. Take extra care to wipe off the tool bank's verification points.
4. Empty the reject bin.

Clean and Lubricate HYDRA Guide Bearings

- Use a Q-tip to clean and lubricate (K-012-0098 GREASE OKS 270) the guide bearings, ('A' in Figure 16-31).

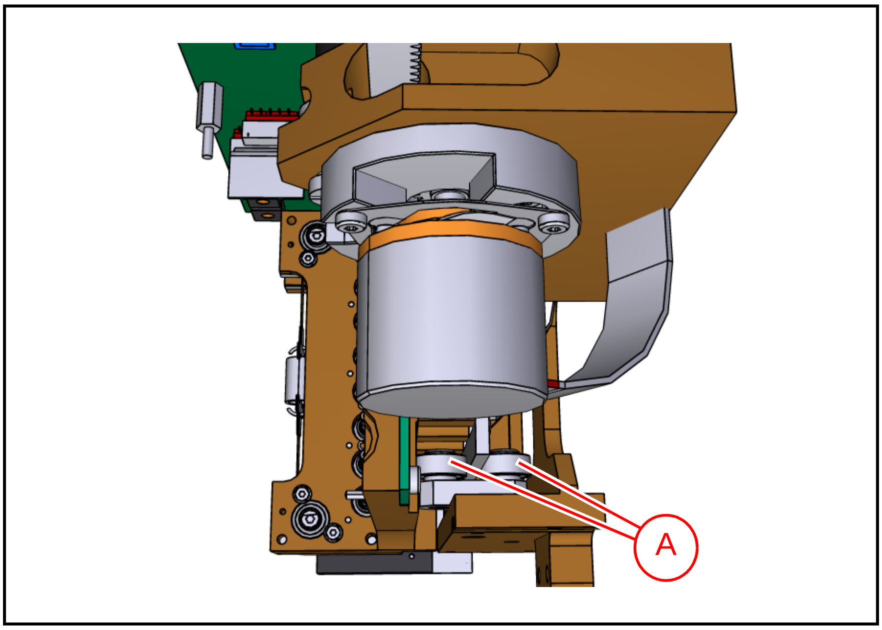


Figure 16-31. HYDRA (top view).

Clean and Lubricate HYDRA Gear Rack and Latch Fingers

- Use a Q-tip to clean and lubricate (K-012-0098 GREASE OKS 270) the gear rack ('A' in Figure 16-31) and latch fingers ('B').

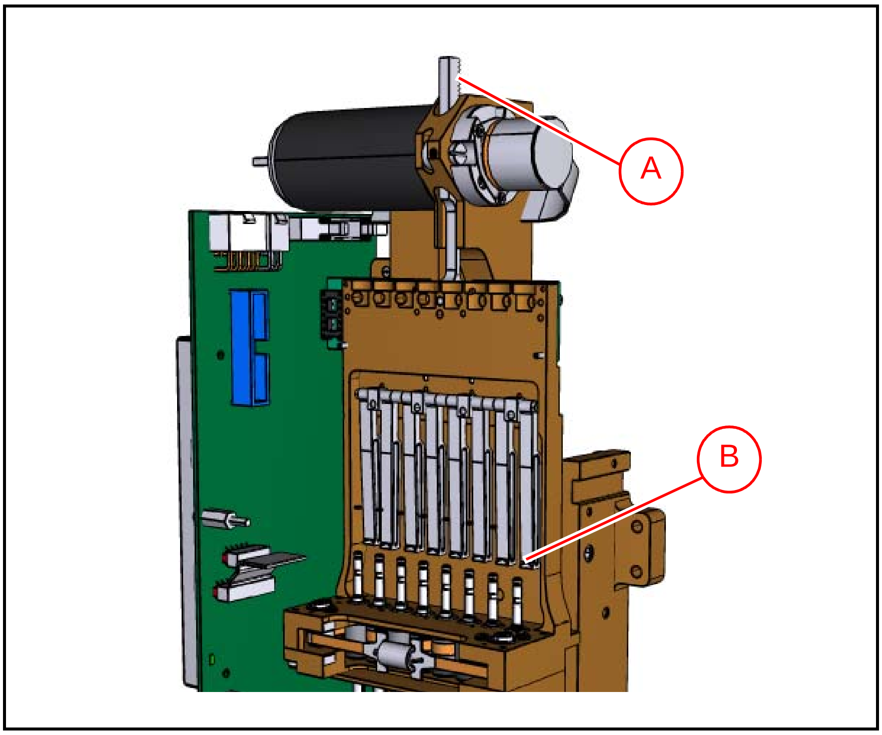


Figure 16-32. HYDRA (top view).

Clean and Lubricate HYDRA Vacuum Pipe Unit

- Use a Q-tip to clean and lubricate (K-012-0085 HYDRAULIC OIL) the vacuum pipe unit behind the springs ('A' in Figure 16-33).

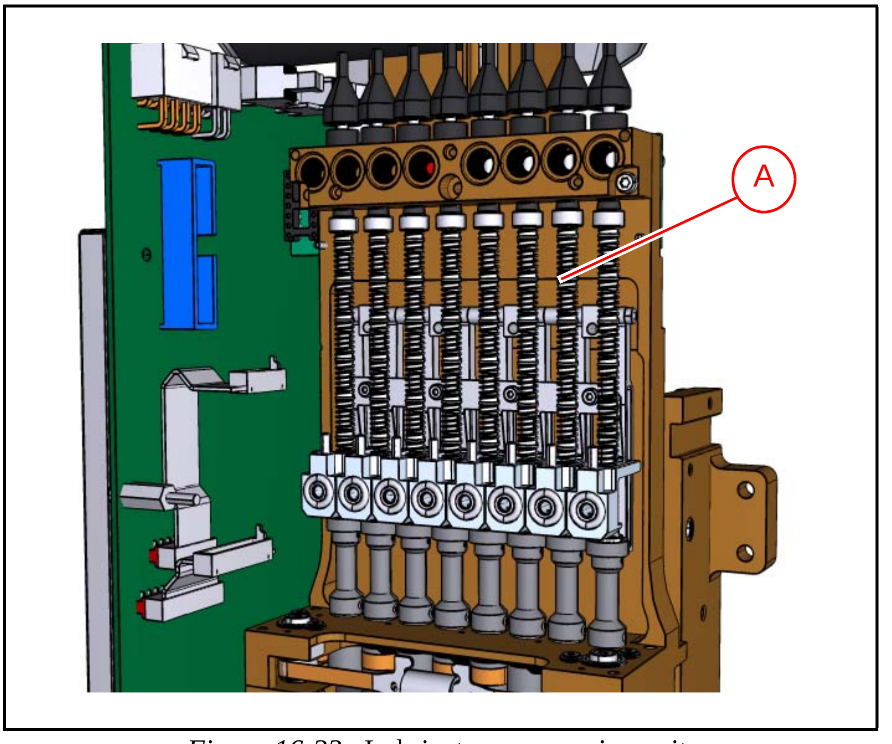


Figure 16-33. Lubricate vacuum pipe unit.

Clean and Lubricate Midas II Mount Head

Note that the procedures described in this section will require that the machine needs to be re-calibrated. Refer to Chapter 4 *Installation and Calibration* for further instructions.

1. Carefully loosen the locking screw ('A' in Figure 16-34) on the tool holder ('B').
2. Remove the tool holder ('B') by turning the tool holder anti-clockwise, see Figure 16-34.

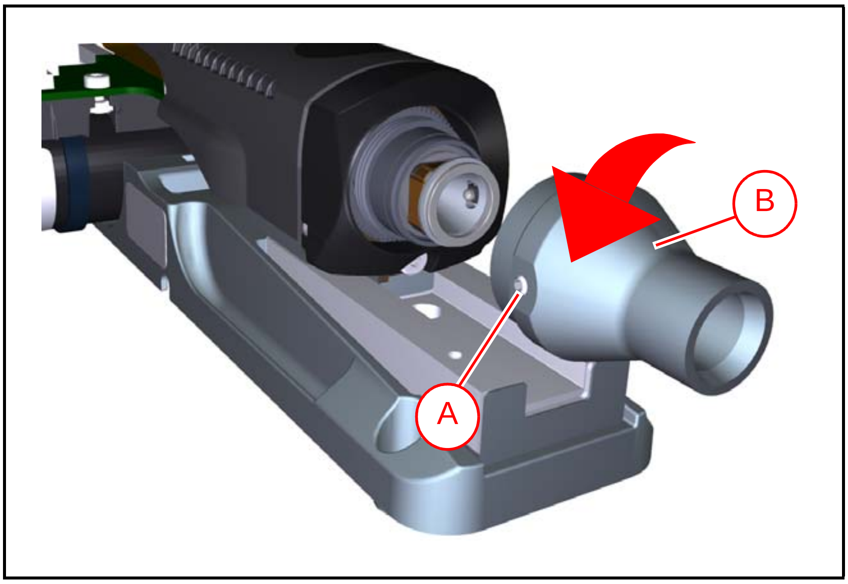


Figure 16-34. Midas II tool holder.

3. Use a Q-tip to clean dirt and dust out from the inside of the tool holder.

4. Gently clean the two force sensor diodes ('C' in Figure 16-35) from dirt and dust. Start with a Q-tip slightly wet in alcohol and then complete the cleaning using a dry Q-tip.

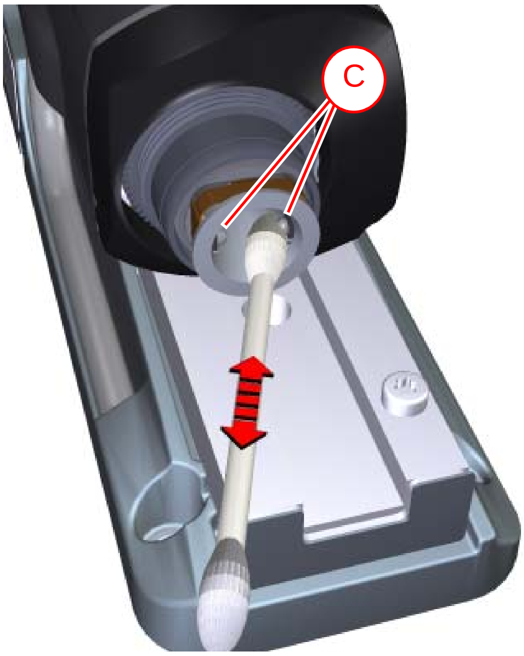


Figure 16-35. Force sensor didos.

5. Remove the old theta sealing ('A' in Figure 16-36 and 16-37) from the tool holder and insert a new theta sealing with the thicker edge facing the bottom of the tool holder, see Figure 16-37.

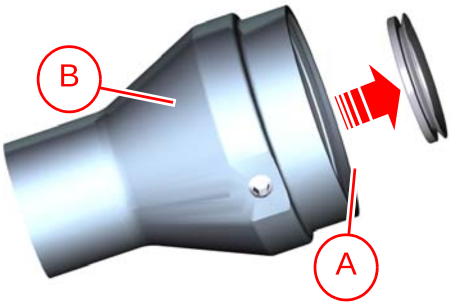


Figure 16-36. Tool holder.

6. Use a suitable tool to carefully orient the theta sealing ('A') to be properly seated in the recess at the bottom of the tool holder (see Figure 16-37).

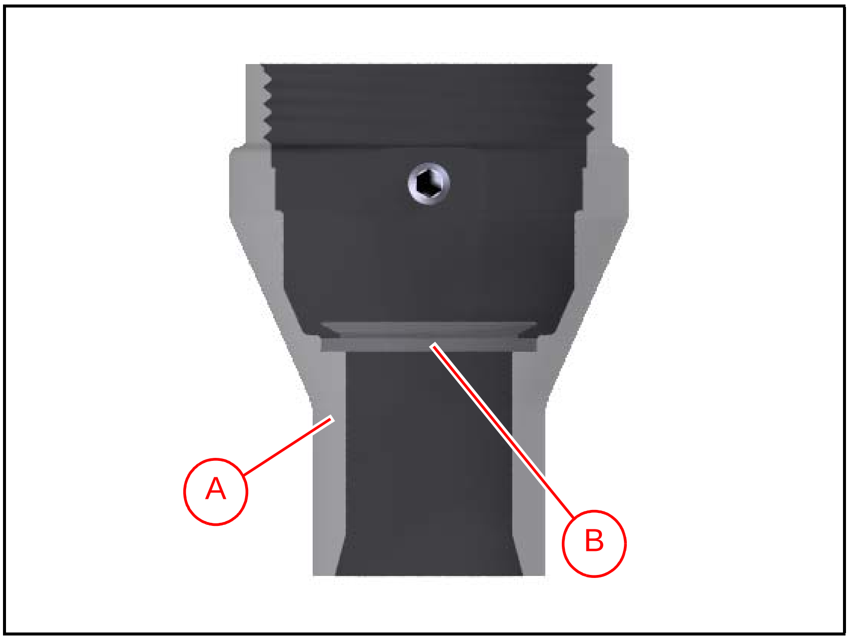


Figure 16-37. Tool holder (front view)

7. Re-assemble the tool holder to the Midas mount head and tighten the locking screw.

8. To gain access to the gear stage, use a torx key to remove the screw ('A' in Figure 16-38) and the black plastic cover ('B').

Do not remove the tool holder ('C' in Figure 16-38).

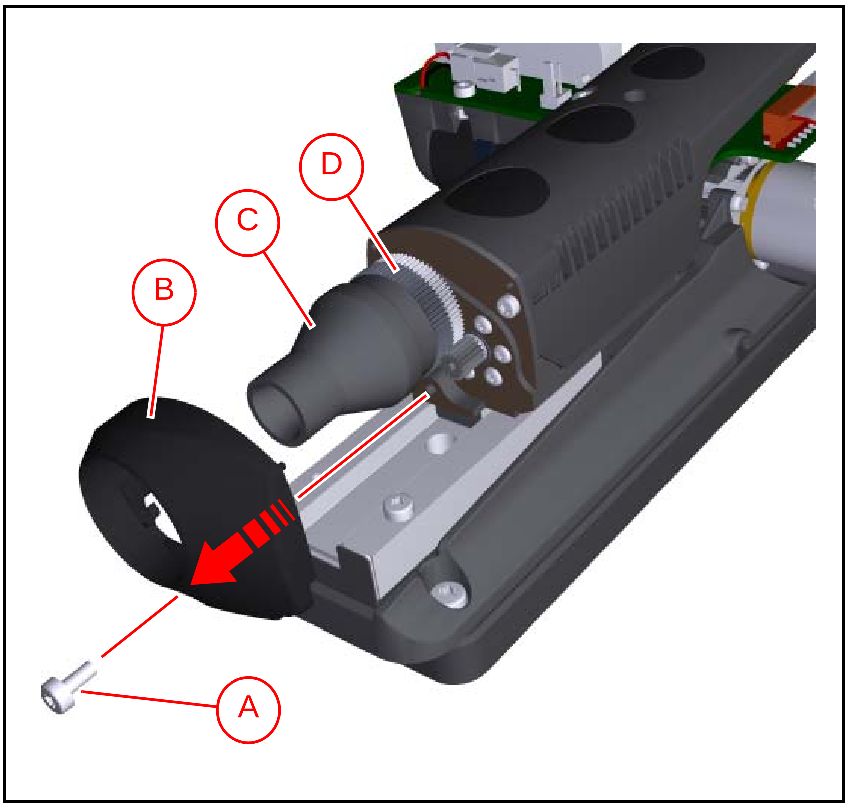


Figure 16-38. Midas gear stage.

9. Use a lint-free cloth to wipe off old grease and dirt from the gear stage ('D' in Figure 16-38) and apply a new thin layer of OKS 270 grease.
10. Manually rotate the tool holder a few times to disperse the grease evenly around the cogwheel ('D').

X Wagon 2000 km

DANGER! This maintenance step is performed in the vicinity of permanent magnets.Personnel wearing pace-makers must be careful in the vicinity of permanent magnets.

CAUTION! Do not approach permanent magnets when carrying objects made of iron, steel or nickel.

CAUTION! Do not wear watches near permanent magnets since they can be damaged.

CAUTION! Do not bring magnetic data media, check or credit cards near permanent magnets. The data on the data media may be erased by the magnetic field.

This section describes the following maintenance tasks:

– *Clean and Lubricate X-Beam Guiding Rails* on page 16-37.

Clean and Lubricate X-Beam Guiding Rails

When the X wagon has travelled 2000 km the X-wagon linear guides and the guiding rails will need to be lubricated. The X wagon linear guide rails need lubrication regularly. The system will monitor this, and warn when the rails are due for lubrication.

Procedure

1. Open the upper top hood by gently pressing a pointed object, for example an M6 Allen key through the holes and releasing the lock on each side of the upper hood. See Figure 16-39.

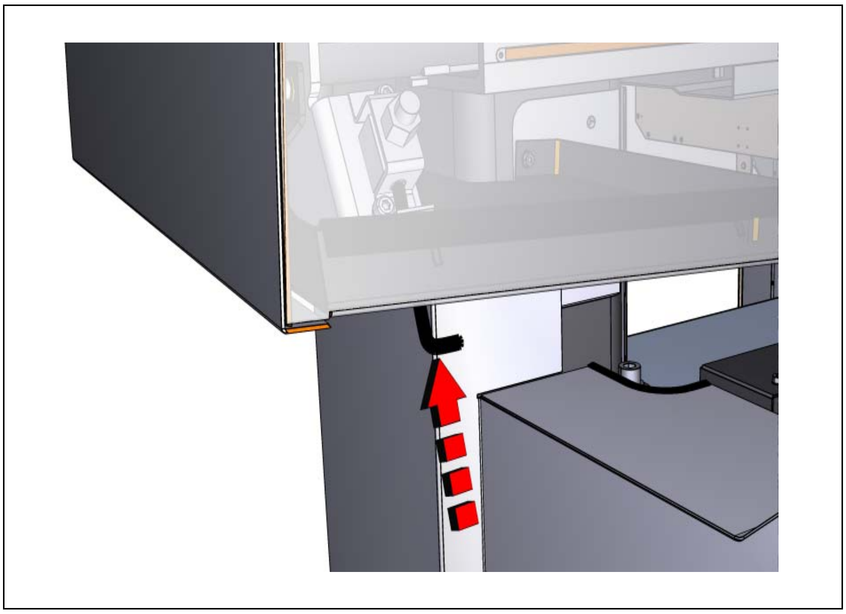


Figure 16-39. Opening the top hood.

2. Remove the two screws ('A' in Figure 16-40) holding the glass shield ('B'), one on each side of the metal beam.
3. Carefully lift the glass shield straight up and remove it.

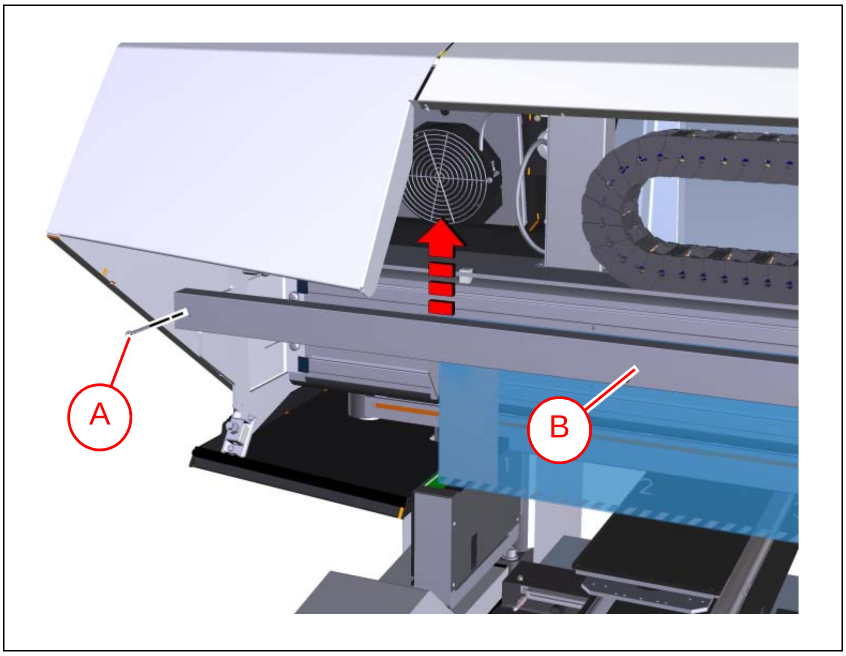


Figure 16-40. Remove glass shield.

4. Wipe off any old grease from the two X-beam guiding rails ('A' in Figure 16-41) and four X-wagon guide blocks ('B') on each X wagon.

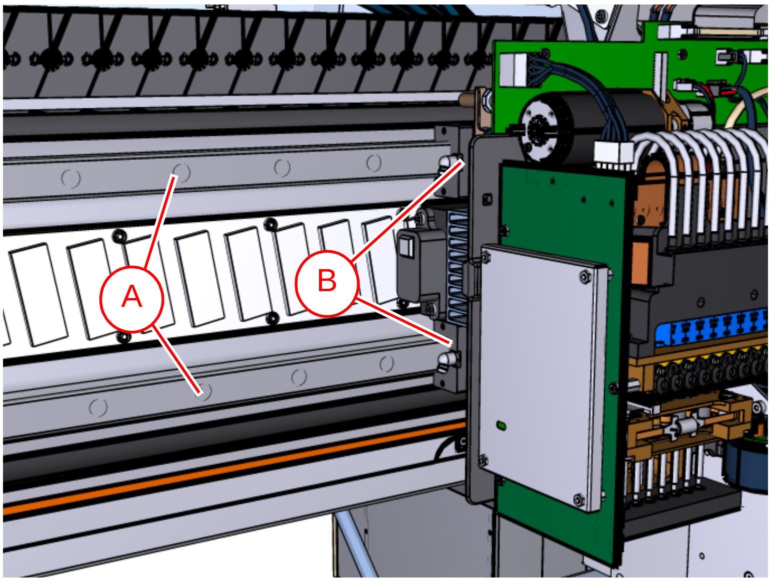


Figure 16-41. Wipe off old grease.

5. Attach the grease gun dispensing nozzle ('A' in Figure 16-42) onto the X-wagon guide block grease fitting ('B'). Pump three times while slowly moving the X wagon by hand.

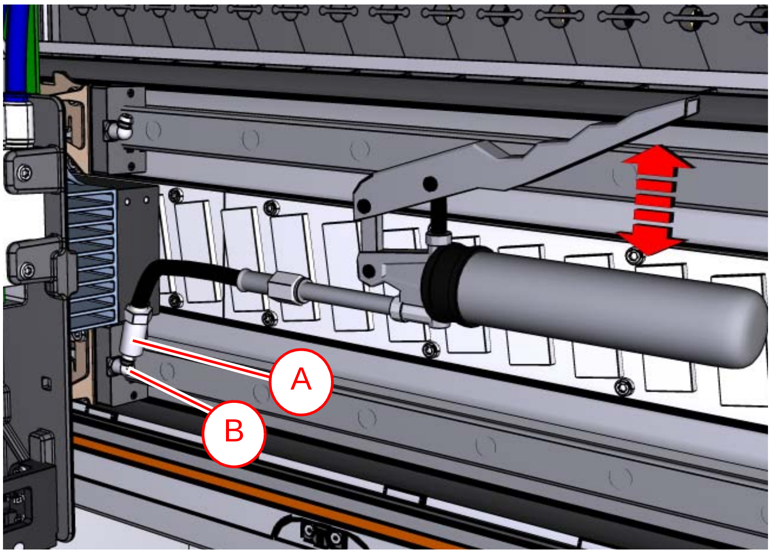


Figure 16-42. Attach the grease gun dispensing nozzle.

The X wagon must be moved at least 0.5 meters while dispersing the grease.

---

6. Wipe off any excess grease and clean the grease fitting.
7. Repeat steps 3 – 5 for the remaining guide blocks.

8. To disperse the grease evenly over the guiding rails, pull the X wagon back and forth along the whole machine length.

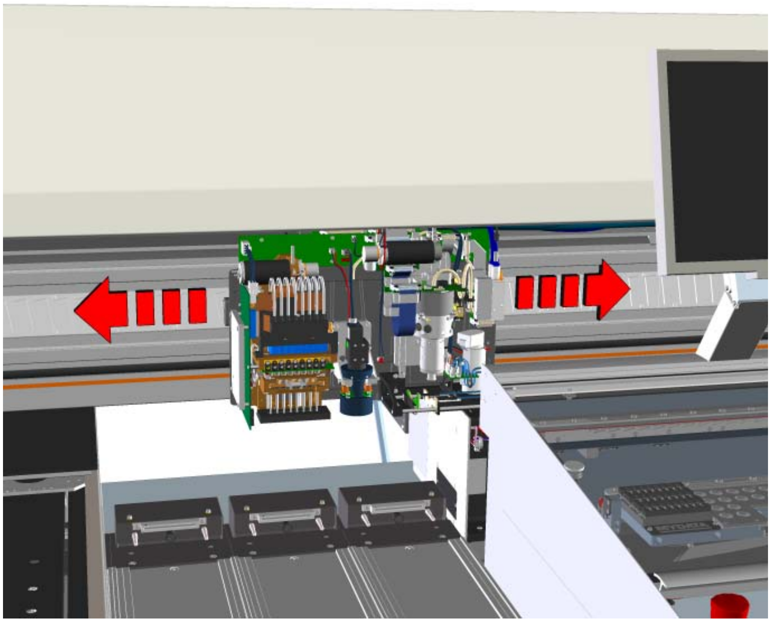


Figure 16-43. Dispersing the grease.

When all four X-wagon guide blocks have been greased you need to distribute the grease evenly. This is done by pulling the X wagon back and forth once along the entire length of the X-beam guiding rails.

9. Repeat the steps 4 – 8 above for the second X wagon (MY100DX).

10. Re-install the glass shield, and close the hood.

Maintenance Quick Guide Tables

This section shows the previously described maintenance tasks as tables that can be printed and used as service protocols.

The maintenance tasks in this section shall only be performed by an authorized maintenance engineer.

Monthly or 160 Hours Maintenance

Maintenance task	Lubrication/Consumables	Completed
Make a backup of TPSys.	N/A	
Clean and Lubricate Midas Tools • Lubricate metal colored Midas mount-head tools. • Inspect and lubricate Midas mount-head tools O-rings.	OKS 270 grease or Omega 28 grease. Shell Tellus Oil 32.	
Preserve DVC (Dual Vision Camera) • Empty the camera dump bin. • Clean the DVC (Dual Vision Camera) optics.	Isoprophyl alcohol. Lint-free cloths.	
Preserve LSC (LineScan Camera) • Empty the camera dump bin. • Clean Linescan camera optics.	Isoprophyl alcohol. Lint-free cloths.	
Preserve HC2 (HYDRA Camera 2) • Empty the HYDRA dump bin. • Clean the HYDRA camera optics.	Isoprophyl alcohol. Lint-free cloths.	
Clean and Lubricate Mechanical Centering Unit • Inspect the mechanical centering unit electrodes. • Clean and lubricate the mechanical unit axles.	Shell Tellus Oil 32. Lint-free cloths.	
Clean and Lubricate Midas Mount Head • Clean and lubricate inside of tool mount head. • Clean and lubricate Midas mount head Z rack.	OKS 270 grease. Lint-free cotton wool buds (Q-tip's).	
Clean and Lubricate Midas II Mount Head • Clean and lubricate inside of tool mount head. • Clean and lubricate Midas II mount head Z rack. • Clean and lubricate z-unit linear guides.	OKS 270 and THK AFJ grease. Lint-free cotton wool buds (Q-tip's).	
Clean the HYDRA Reference Background • Wipe off reference background.	Lint-free cloths	

Maintenance task	Lubrication/Consumables	Completed
Clean and Lubricate HYDRA Vacuum Tubes • Use a Q-tip to clean and lubricate the HYDRA vacuum tubes.	K-012-0085 HYDRAULIC OIL. Lint-free cotton wool buds (Q-tip’s).	
Clean and Lubricate HYDRA Tool Tubes • Use a Q-tip to clean and lubricate the HYDRA Tool tubes. Be sure to lubricate the vertical recesses in the tool tubes.	K-012-0122B GREASE PARALIQ GA 351, 25G). Lint-free cotton wool buds (Q-tip’s).	
Preserve HYDRA Mount Tools • Remove tools manually and inspect them for wear and/or damage.	Rubber tips.	
Clean and Lubricate Tray Wagon Magazine • Clean and lubricate the Tray Wagon Magazine rod.	Shell Tellus Oil 32. Lint-free cloths.	
Replace Midas Vacuum Filter • Replace the Midas vacuum filter. • Check the vacuum system as described in Chapter 10 *Pneumatic System*.	Midas vacuum filter.	
Preserve Linear Scales • Wipe off the X and Y-linear scale using an isoprophyl alcohol wetted lint-free cloth.	Isoprophyl alcohol. Lint-free cloths.	
Preserve LCD Screen and Warning Signs • Wipe off the screen if needed. Use a soft cloth and dampen the cloth slightly with clean water. • Inspect the Warning signs. Replace if necessary.	Isoprophyl alcohol. Lint-free cloths.	

Yearly or 2000 Hours Maintenance

Maintenance tasks	Lubrication/Consumables	Completed
Replace Top Cover Fan Filters • Replace the fan filters.	Filter mat.	
Replace Electronic Shelf Filter • Replace the filter mat in the filter cassette.	Filter mat.	
Replace Vacuum Pump Filter • Replace the vacuum pump filters.	Vacuum pump filter.	

Maintenance tasks	Lubrication/Consumables	Completed
Preserve Midas and HYDRA Tool Bank • Wipe off any solder paste and glue from the tip of the mount tools carefully with a cloth slightly wet in alcohol. • Wipe off the tool bank with a cloth slightly wet in alcohol. Take extra care to wipe off the tool banks verification points. • Empty the reject bin.	Isoprophyl alcohol. Lint-free cloths.	
Clean and Lubricate HYDRA Guide Bearings • Use a Q-tip to clean and lubricate the HYDRA Guide Bearings.	K-012-0098 GREASE OKS 270. Lint-free cotton wool buds (Q-tip's).	
Clean and Lubricate HYDRA Gear Rack and Latch Fingers • Use a Q-tip to clean and lubricate the HYDRA Guide Bearings.	K-012-0098 GREASE OKS 270. Lint-free cotton wool buds (Q-tip's).	
Clean and Lubricate HYDRA Vacuum Pipe Unit • Use a Q-tip to clean and lubricate the vacuum pipe unit behind springs.	K-012-0085 HYDRAULIC OIL. Lint-free cotton wool buds (Q-tip's).	
Clean and Lubricate Midas II Mount Head • Clean force sensor diods. • Replace theta sealing. • Clean and lubricate theta gear stage.	OKS 270 grease. Lint-free cotton wool buds (Q-tip's).	

X Wagon 2000 km Maintenance

Maintenance tasks	Lubrication/Consumables	Completed
Clean and Lubricate X-Beam Guiding Rails • Use a grease gun to lubricate the guiding rails.	Gleitmo 585 K grease Lint-free cloths.	

Appendix A - Service Program Reference Guide

The Service Program is a collection of various basic service tools selectable from a main menu (see Figure A-1).

There is also an Extended Service Program that is basically the same program as the Service Program, but some of the sub menus have more options than the Service Program.

The Extended Service Program contains procedures that should only be carried out by an authorized MYDATA service engineer. The Extended Service Program is not covered in this manual.

Starting the Service Program

Use any of the alternatives below to start the service program.

- If you are currently running TPSys, select *Exit* > *Exit To Service*
- Select the *Restart TPSys* option in the *Exit* menu and press <Space> to get the startup menu. In the startup menu, select the *Service* option.
- Enter the command `service` at the Linux prompt to start the service program.

The Service Program main window is shown in Figure A-1.

Figure A-1. Service program main menu

Main Menu Options

Described below are some of the options and commands that are available from the main menu.

Any dimmed alternatives in the shown menus are not applicable to the current machine configuration.

Board

This menu item lists the servo computer boards. The available functions under each of the boards are for example:

- Show status.
- Load or reset motor controller boards.

Motor

The options found under this menu item are used to control the various axes of the machine, including:

- Initiate motors and read position or range.
- Control locks and latches for Midas and HYDRA mount heads.
- Measure frictions.

Head

The options found under this menu item are used to perform various tests on the Midas and HYDRA mount heads, including:

- *Test subsystems*, *Motor test* and *Calibrate force sensor*.

Magazine

The options found under this menu item are used to control tape and vibrator magazines, including:

- Step, poll and test magazines or removable feeders.

Vacuum

The options found under this menu item are used to control the vacuum pump and the valves for vacuum and air pressure for the Midas mount head tool and the HYDRA mount tools. The vacuum and force sensors can also be shown from this option.

Conveyor

The options found under this menu item are used to control the Y-wagon conveyor features.

Camera

The options found under this menu item are used to control the various illumination units and cameras.

Utility

The options found under this menu item are used to control and indicate:

- Warning lamps.
- Show about information boxes and show hard disk status.

Exit

The option found under this menu item is used to exit the Service Program.

Board

This menu contains options regarding the various boards (*CanIC board* to *MotZ board*) that control the movements of the machine. Selecting one of the boards opens a submenu with options that may vary, depending on selected board.

Any dimmed alternatives in the shown menus are not applicable to the current machine configuration.

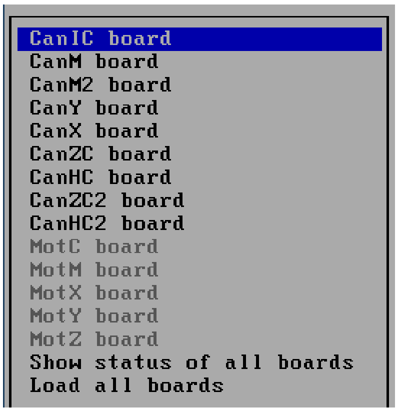


Figure A-2. Board menu.

The following submenu options are available for the selected board.

- Show status.
- Reset.
- Load.
- Sensors.

Show status
Displays motor controller load status and servo identification. The information in this box may vary, depending on selected board.

Reset
Performs a hardware reset of the selected board.

Load
Loads the displayed servo program to the selected board.

Sensors
This option is applicable to the *CanIC board* only. Selecting this option opens the *Conveyor board edge sensors* dialog box, which displays information about the internal conveyors board edge sensors.

Show status of all boards
Displays motor controller load status and servo identification for all the boards. Unloaded boards, if any, can also be loaded by confirming this option in the dialog box. If you do not want to load unloaded boards, press the <Esc> key.

Load all boards
Loads all servo files.

Motor

This menu contains options regarding the motors (*C motor* to *Gluepot motor*) that control the various axes of the machine. Selecting one of the motors opens a submenu with options that may vary, depending on selected motor.

Any dimmed alternatives in the shown menus are not applicable to the current machine configuration.

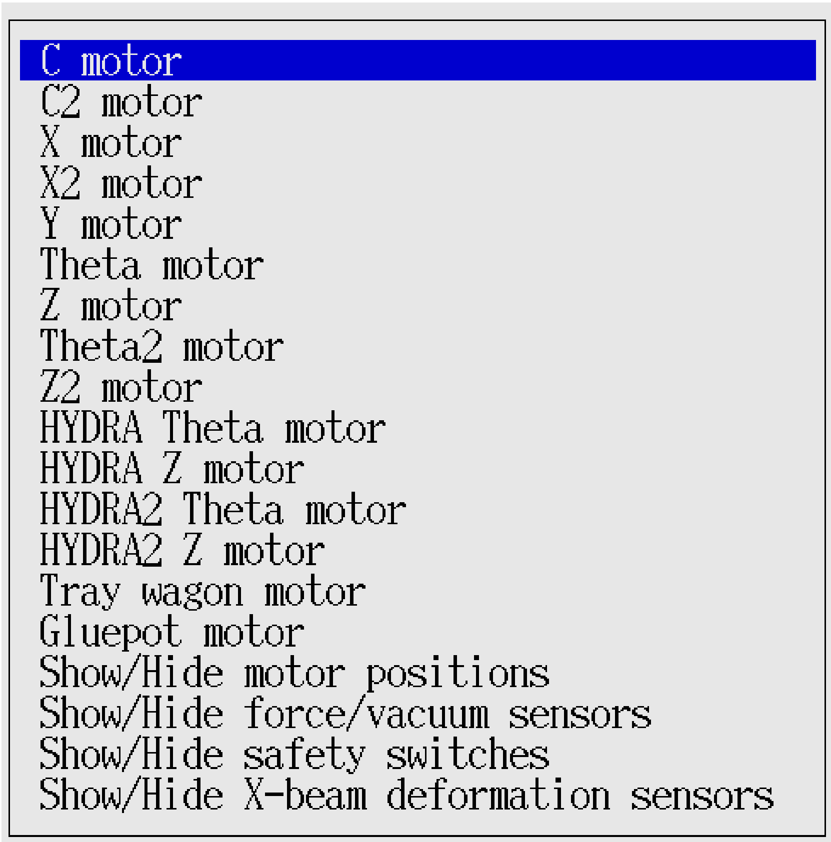


Figure A-3. Motor menu.

The following submenu options are available for the motor's. The options may vary, depending on the currently selected motor.

– Initiate or Initiate motor.

– Read range.

– Read position.

– Stand by.

– Locks.

– Latches.

– Measure friction.

– Calibrate force sensor.

– Measure cog play.

Initiate or Initiate motor

This option is applicable to all motor functions. This option makes a hardware initiation, with other words moves to the mechanical stop and resets the position counter.

If Z axis and/or HYDRA Z is not initiated then the system will ask if you want to initiate Y motor anyway. Before proceeding, check that there is no risk for collision between Z axis and/or HYDRA Z and Y axis.

Read range

This option displays the selected motor's range.

Read position

This option displays the current position. To get the position value for a desired position, press <Enter> and the current position is shown.

Stand by

This option is applicable to the X-motor function only. It can be used if the X motor has been stopped in a position where the servo and X motor keep regulating continuously. This situation causes an disturbing noise from the X-wagon motor. Using this command stops the regulation and thus the noise. The stand-by mode ceases automatically at the next X wagon move command.

Locks

This option is applicable to the Z-motor function only. It controls the magnet locks for the Z axis. The locks can be individually controlled. The locks are controlled by the MOT-C board.

Locks to magnet

This option is only applicable to the z-motor function on the Midas II unit. It moves the Z unit to its upper position where it will be locked to a magnet.

Latches

This option is applicable to the HYDRA Z-motor function only. The option provides a way to control the mount tool latches, one latch for each of the eight mount tools. Selecting this alternative displays the dialog shown in Figure A-4.

Dialog box HZ motor latches

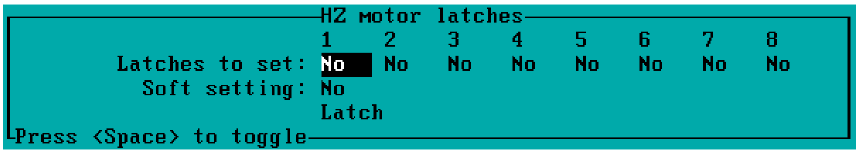


Figure A-4. HZ motor latches.

Latches to set

Each HYDRA mount tool that has its latch set will follow the vertical movement of the Z mechanism. The latches are set by selecting the *Yes* option for the desired tool numbers. Tools with the *No* option will not move.

Soft setting

Changing the state of the latches can be made softly (slowly). This setting enables/disables this feature.

Latch

Highlight this option and press <Enter> to carry out settings made. To toggle between *Yes* and *No* press <Space>. The HYDRA Z-axis lock and latches are controlled by the *CanHC board*.

Measure friction

This option measures the friction, and is applicable to all the movement axes. Selecting this command opens the following dialog box.

Dialog box Measure friction

Depending on the selected motor, the available options differ somewhat. When measuring friction on the *X motor*, *Y motor* or *Tray wagon motor* the dialog box shown in Figure A-5 is displayed.

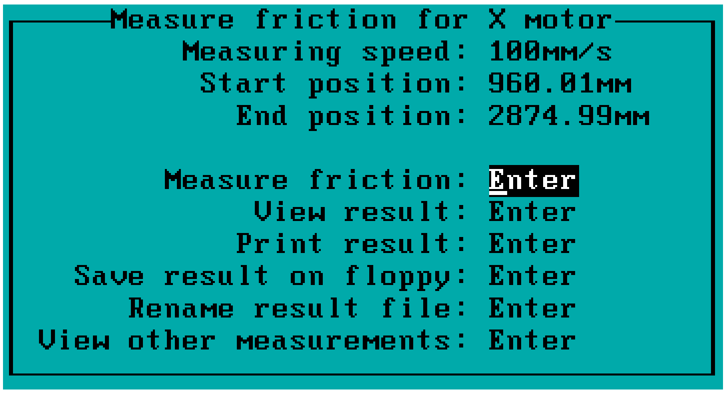


Figure A-5. Measure friction for X motor or Y motor.

Measuring speed

Speed value while measuring friction.

Start position

Value that indicates where on the unit the friction measurement area starts.

End position

Value that indicates where on the unit the friction measurement area ends.

Measure friction

Start the measuring procedure.

View result

Opens the information box that shows the friction measurement result.

Print result

Print the measurement result on a printer.

Save result on floppy

Save the measurement data on a floppy disk.

Rename result file

Rename the measurement data file.

View other measurements

View results from previous measurements. The friction result is presented as a histogram, with the position intervals to the left and the actual force required to move the unit is represented by ‘X's to the right in the figure. A summary of the friction result is shown above the histogram.

Calibrate force sensor

This option is used to calibrate the tool indicator used for the Midas or HYDRA mount heads spring-loaded tools.

Measure cog play

This option is only applicable to the *Z motor* or *HYDRA Z motor* function. The procedure is used to measure the cog play on the *Z motor* or *HYDRA Z motor*.

Gluepot motor

This option is used to start and stop the glue pot rotation motor.

Show/Hide motor positions

Selecting this option opens and closes an information box that shows the positions for the motors used in the system.

Show/Hide vacuum/force sensors

Selecting this option opens and closes an information box that shows the vacuum, pressure, flow, and force values used in the system.

Information box Vacuum and force

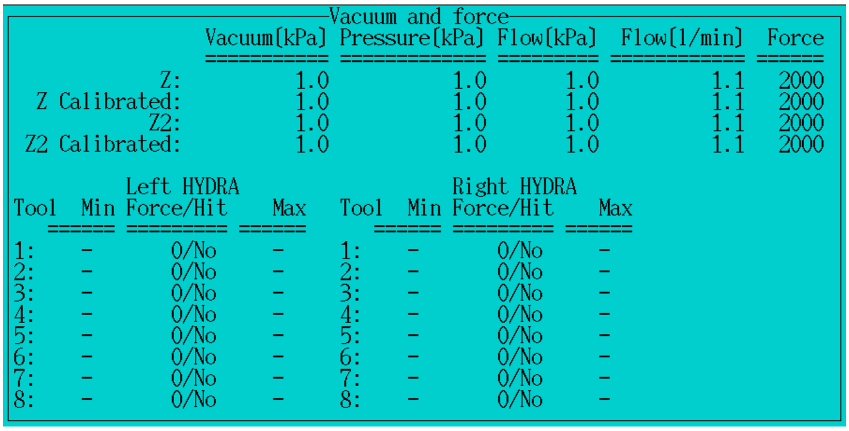


Figure A-6. Vacuum and force information box*.*

Vacuum

When there is no vacuum or pressure in the system the viewer shows the zero-level offsets of the sensors. All values are presented in kPa.

The vacuum level is typically -80 kPa (i.e. 80% or -12 psi or 20 kPa absolute), and the overpressure is typically 30 kPa (i.e. 0.3 Bar or 5 psi).

Pressure[kPa]

The *Pressure[kPa]* level is typically 30 kPa (i.e. 0.3 Bar or 5 psi).

Flow[kPa]

Sensor reading of pressure difference.

Flow[kPa] [l/min]

The flow in liter per minute calculated from the *Flow[kPa]* reading.

Force

Tool indicator value. Normal value is approximately 1400 for released tool and 600 when the tool nozzle is pressed in. The difference between the max and the min value for the *Force* sensor should be at least 400 units.

Hit

Indicates, individually for the available HYDRA mount tools, if the nozzles have ‘hit' components, i.e. are pressed in somewhat (indicated *Yes*) or not (*No*). You can test the function by gently pressing the nozzles upwards.

Show/Hide safety switches

Displays the status of the emergency stop button.

Show/Hide X-beam deformation sensors

Selecting this option opens and closes an information box that shows the *X-beam deformation sensors* (see Figure A-7).

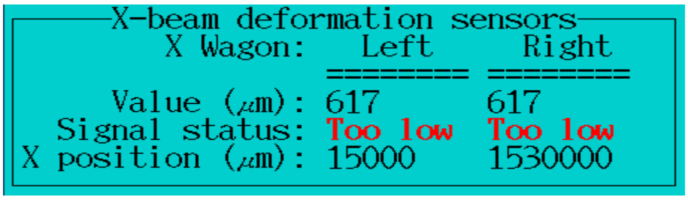


Figure A-7. X-beam deformation sensors.

Head

This menu contains options regarding the mount heads (Z and HYDRA) Selecting one of the mount heads opens a submenu with options that may vary, depending on selected head.

Any dimmed alternatives in the shown menus are not applicable to the current machine configuration.

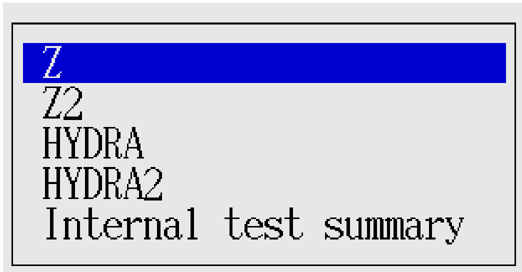


Figure A-8. Head menu.

The following submenu options are available for the mount head's.
The submenus below are context dependent, that is, the selectable options will vary, depending on the currently selected mount head.

- Test subsystems.
- Motor test.
- Calibrate force sensor.
- Latches
- Passivate
- Cycle HYDRA mount.
- Show test logs

Test subsystems

Selecting this option opens a submenu where it is possible to perform tests on different subsystems on the mount head. See Figure A-9.

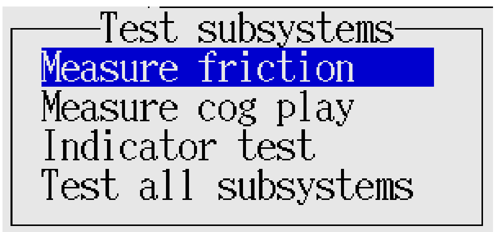


Figure A-9. Test subsystems menu.

Measure friction

Measures the friction on the selected mount head. The result can be viewed by selecting the *Show test logs* option (see page A-10). Depending on selected mount head, refer to one of the following guides for more information regarding the result.

- Midas Troubleshooting Guide (P-010-0101-EN).

- HYDRA Troubleshooting Guide (P-010-0103-EN).

Measure cog play

Measures the cog play on the selected mount head. The result can be viewed by selecting the *Show test logs* option (see page A-10). Depending on selected mount head, refer to one of the following guides for more information regarding the result.

- Midas Troubleshooting Guide (P-010-0101-EN).

- HYDRA Troubleshooting Guide (P-010-0103-EN).

Indicator test

The indicator test measures the span of the tool nozzle indicator.

Test all subsystems

Selecting this option performs a number of internal tests on the mount head. This option also performs internal tests on the servo. When done, the results are presented on the screen.

Depending on selected mount head, refer to one of the following guides for more information regarding the result.

- Midas Troubleshooting Guide (P-010-0101-EN).

- HYDRA Troubleshooting Guide (P-010-0103-EN).

Motor test

Selecting this option opens an information box that shows the different voltage values in the selected mount head. In this box it is also possible to test the function of the motors by running the motors with different settings.

Calibrate force sensor

This option is used to calibrate the tool indicator used for the Midas or HYDRA mount heads spring-loaded tools.

Latches

This option is applicable to the HYDRA mount head only. It controls the magnet lock for the Z movement mechanism and the mount tool latches, one latch for each of the eight mount tools.

For more information, refer to section *Dialog box HZ motor latches* on page A-5.

Passivate

This option is applicable to the HYDRA mount head only. The command temporarily disables the servo controller which enables *HZ* and *HYDRA Theta* to be moved manually.

Cycle HYDRA mount

This option is applicable to the HYDRA mount head only. The test simulates pick and place sequence on a hard and flat surface. This test may detect transducer drifts, latch errors and intermittent indicator errors.

Show test logs

Selecting this option opens an information box that shows a log list of all tests and the corresponding results for the selected mount head.

Magazine

Step, polling and MagLink commands can be given to a desired magazine by selecting the *Magazine* menu.

Any dimmed alternatives in the shown menus are not applicable to the current machine configuration.

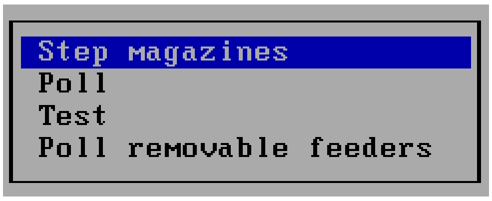


Figure A-10. Magazine menu.

All magazine functions are controlled by the *CanM board*.

Step magazines

Sends a component advancement command to the magazine.

This command can be used to obtain component advancements without picking a component after each advancement.

Select the desired magazine by entering the magazine position in the *Select slot* dialog box.

After selecting the desired magazine, you can choose to make advancement steps on multiple feeders or on a single feeder.

If you select *Yes* a multiple feeder dialog box is shown. If you select *No* a single feeder dialog box is shown. They show the following data:

Dialog box feeder(s)

Feeders/Feeder

You can choose feeder by pressing <Space> (multiple feeders) or enter the desired feeder number (single feeder).

Feeds wanted

Enter the desired number of feeds to be performed.

Steps per feed

Enter the desired number of steps per feed to be performed on each feeder.

Step

Starts the step command.

Steps done

Counts the number of steps done.

Poll

Polls those magazines which are inserted in the machine. The polling result is displayed on the monitor. If the text in the *Buttoned out* column is *No* the magazine is in operation (the green LED on the magazine is lit with a steady light). If the text is *Yes* the system does not pick from the magazine (the green LED is either flashing or off). If it is neither of these but '---' the magazine type has no release button.

If you press the <F1> key, then the type and serial numbers are displayed as octal numbers. Another press on the <F1> key toggles back to decimal presentation.

Test

Selecting this option opens a submenu where it is possible to perform a number of tests on a magazine.

This option tests continuously major functions of the selected magazine.

Select the desired magazine by entering the magazine position in the *Select slot* dialog box. A continuously updated test result for the selected magazine is shown with the following data:

Dialog box test

Test result

Passed – A communication test completed successfully.

Off – The test was not successfully completed.

Button

No – The release button on the magazine is released.

Yes – The release button on the magazine is pressed in.

LED's

Off – Both of the LEDs are temporarily off.

Yellow – The Yellow LED only is temporarily lit.

Green flash – The Green flash LED only is temporarily lit.

Yellow flash – Yellow flash of the LEDs are temporarily lit.

Off – The LED test was not successfully completed.

The *Button* and *Lamps* status shall reflect the visible states of these functions on the magazine.

Poll removable feeders

Polls magazines that are equipped with removable feeders if any.

Select the desired magazine by entering the magazine position in the *Select slot* dialog box. The polling result is displayed on the monitor.

The serial numbers are presented both by decimal and by hexadecimal notation in the information box.

Vacuum

The vacuum pump and the valves for pressure and vacuum can be controlled with the options in the *Vacuum* menu.

Any dimmed alternatives in the shown menus are not applicable to the current machine configuration.

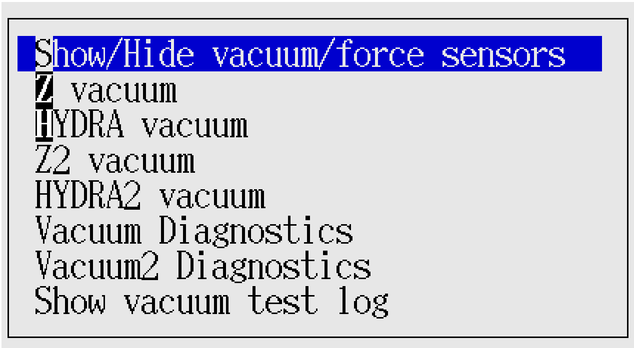


Figure A-11. Vacuum menu.

Show/Hide vacuum/force sensors

Opens and closes an information box that shows the vacuum and the tool indicator values. This menu option is the same as the *Show/Hide force/vacuum sensors* option in the *Motor* menu described in *Show/Hide vacuum/force sensors* on page A-7).

vacuum

Opens the vacuum control dialog box for the standard mount tool. You can control the vacuum pump, the vacuum valve and the pressure valve by moving the cursor to the desired option and pressing <Enter>.

To be able to see the vacuum level for the Midas mount tool, open the vacuum sensor measuring box by selecting the *Show/Hide vacuum/force sensors* (see page A-7).

HYDRA vacuum

Opens a vacuum control dialog box for the HYDRA unit. You can control the vacuum pump and the pressure valve by moving the cursor to the desired option and pressing <Enter>.

The vacuum valves are controlled by moving the cursor to the desired tool number, pressing <Space> for an *Open* or *Close* action, moving the cursor to the *Set* option, and pressing <Enter>.

To be able to see the vacuum levels in the HYDRA mount tools, open the vacuum sensor measuring box by selecting the *Show/Hide vacuum/force sensors* (see page A-7).

Vacuum Diagnostics

Opens a submenu with the following options:

Run Extensive test (all)

This option will run all tests below except from the ’Vacuum in Z’ test. This test needs assistance from the operator. See Chapter 10 for detailed information about the test.

Run Automatic test (not leak time)

This option will run the tests below except from ’Valve times Z’, ’Valve times HYDRA’, ’Leak time’ and, the ’Vacuum in Z’. This test does not need any operator interaction. See Chapter 10 for detailed information about the test.

Vacuum level

This test measures the maximum vacuum level and is described on page 10-9.

Vacuum flow

This test measures the air flow when medium vacuum is applied. This is described on page 10-10.

Pressure at med flow

This test measures the pressure when there is a medium air flow through the system and is described on page 10-10.

Pressure at min flow

This measures the pressure when there is a minimum air flow through the system. This is described on page 10-11.

Filter flow Z

This test measures the condition of the Z filter. This is described on page 10-11.

Valve times Z

This test measures the response time of the Z valves. There are two types of tests on the valves, valve on time and valve off time. This is described on page 10-12.

Filter flow HYDRA

This test measures the condition of the HYDRA filters. This is described on page 10-11.

Valve times HYDRA

This test measures the response time of the HYDRA valves. There are two types of tests on the valves, valve on time and valve off time. This is described on page 10-12.

Leak time

This test measures if there is any leakage in the system. This is described on page 10-12.

Vacuum in Z

This test measures the relative leakage for the Z unit.

Show vacuum test log

This option shows the measured values, the status and the limits for the measurement performed.

Conveyor

From the *Conveyor* menu, you can control a number of conveyor features.

Any dimmed alternatives in the shown menus are not applicable to the current machine configuration.

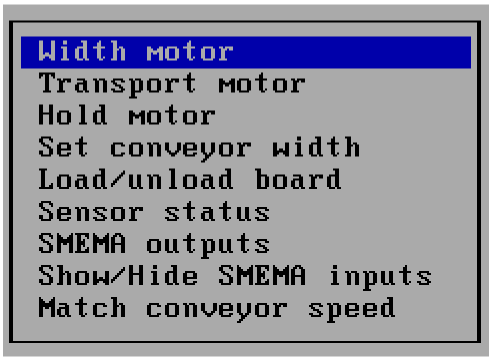


Figure A-12. Magazine menu.

Selecting one of the motors (*Width motor*, *Lift motor* or *Transport motor*) opens a popup menu with options that may vary, depending on selected motors.

The following submenu options are available for the selected motor.

- Initiate.
- Read range.
- Read position.
- Move, Movego.
- Toggle axis.
- Measure friction.

Initiate

To initiate the different conveyor motors, ensure that the conveyor path is empty (no PCB in the path) and select the Initiate option in the popup menu.

Select *Yes* in the dialog box to perform the motor initiation.

Read range

This option displays the selected motor's range.

Confirm the Read command by pressing <Enter>. The *Min* and *Max* positions of the selected range are shown in the box.

Read position

This option displays the current position. To get the position for a desired position, move to the position when the *Read Conveyor width* box is shown. Then, confirm the *Read* command by pressing <Enter>. The current position is shown.

Move, Movego

These options are advanced movement commands that can be used by service engineers to perform various test and service procedures.

CAUTION! Due to the risk of damaging the machine, do not run the Movement commands without a full understanding of their function.

Toggle axis

This option toggles the conveyor axis position, that is moves the conveyor axis between its end positions.

This command will move the selected conveyor axis to the opposite end of its travel. If the axis is not at either end, it will move to the end furthest from its current position.

Measure friction

This option measures the friction. By selecting this option in the *Conveyor* submenu, a popup box is shown with the following data:

Dialog box Measure friction

```
Measure friction for Conveyor width motor
        Measuring speed: 10mm/s
         Start position: 0mm
           End position: 0mm

       Measure friction: Enter
            View result: Enter
           Print result: Enter
    Save result on floppy: Enter
      Rename result file: Enter
 View other measurements: Enter
```

Figure A-13. Measure friction on conveyor motors.

Measuring speed

Speed value while measuring friction.

Start position

Value that indicates where on the Conveyor the friction measurement area starts.

End position

Value that indicates where on the Conveyor the friction measurement area ends.

Measure friction

Start the measuring procedure.

View result

Opens the information box *Conveyor Width Axis Friction Measurement Result*. The friction result is presented as a histogram, with the position intervals to the left and the actual force required to move the Conveyor Width Axis is represented by ‘X's to the right in the figure. A summary of the friction result is shown above the histogram in the information box.

Print result

Print the measurement result on a printer.

Save result on floppy

Save the measurement data on a floppy disk.

Rename result file

Rename the measurement data file.

View other measurements

View results from previous measurements.

Load/unload board

By selecting the *Load/unload board* option in the *Conveyor* menu a *Grab*/*Release* menu is shown.

You can grab, and release the board by selecting the desired option from the menu and pressing <Enter>.

Sensor status

This option is only applicable for CAN-controlled conveyors.

Select *Board* > *CanIC board* > *Sensors* to view the status of the *Conveyor board edge sensors*.

SMEMA outputs

To be able to test the conveyor system, the SMEMA output from the machine can be manipulated by the operator. This is performed by first selecting the *SMEMA outputs* option in the *Conveyor* menu.

You can set channel 1 and channel 2 to be busy or available by selecting the desired option from the menu and pressing <Enter>.

Show/Hide SMEMA inputs

The SMEMA input signal from the prior conveyor system can be shown or hidden by selecting the Show/Hide SMEMA inputs option in the Conveyor menu.

Match conveyor speed

With this option you can match the external conveyor speeds with the internal conveyor speed.

Camera

The *Camera* menu controls the positioning camera on the X wagon, the optical centering vision camera, the HYDRA vision camera, and Linescan camera.

Any dimmed alternatives in the shown menus are not applicable to the current machine configuration.

```
X-wagon camera 1
X-wagon camera 2
Optical centering camera 1
Optical centering camera 2
Optical centering camera 3
Optical centering camera 4
HYDRA camera
Linescan camera 1
Linescan camera 2
All cameras off
--------------------------
Show LSAD status
```

Figure A-14. Camera menu.

When a camera is selected you will get a pop-up window where you can turn on or off the camera. Depending of selected camera you will also be able to select which lighting to use for a particular camera.

X-wagon camera 1 or *X-wagon camera 2*

Turns on the X-wagon camera.

Selecting this camera opens a dialog box where you can adjust the illumination.

Optical centering camera 1 to *Optical centering camera 4*

Turns on the installed optical centering camera(s). The system can utilize up to four different optical centering cameras.

HYDRA camera

Turns on the HYDRA centering camera, if any.

Linescan camera 1 or *Linescan camera 2*

Turns on the Linescan camera(s).

All cameras off

Turns off all the cameras.

Show LSAD status

Selecting this option opens an information box that shows the current status of the Linescan cameras LSAD board in the machine.

Utility

From the *Utility* menu, you can control the following features.

Any dimmed alternatives in the shown menus are not applicable to the current machine configuration.

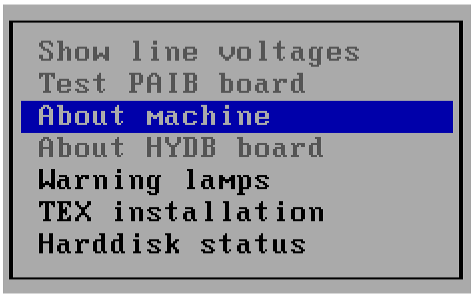


Figure A-15. Camera menu.

About machine
This option shows the machine type, the machine serial number, and the machine name:

- *Model*: MY100-14
- *Serial*: 140001
- *Name*: MY100-Machine

Warning lamps
This option is used to test the lamps in the signal tower. Each lamp can be set to *On*, *Off* or *Blink*. This test does not affect the lamp configuration setting.

TEX installation
This option is used to initially install the TEX Tray Exchanger, which has to be carried out by MYDATA service personnel.

Harddisk status
Selecting this option opens an information box that shows the current status of the hard disks used in the machine.

Appendix B – About the Documentation

The documentation of the MYDATA component placement machines comprises the following parts:

- Operator's manual.
- Programming manual.
- Service manual.
- Software manual.
- Spare parts catalog.

The document structure in Figure B-1 shows the intended user for each document.

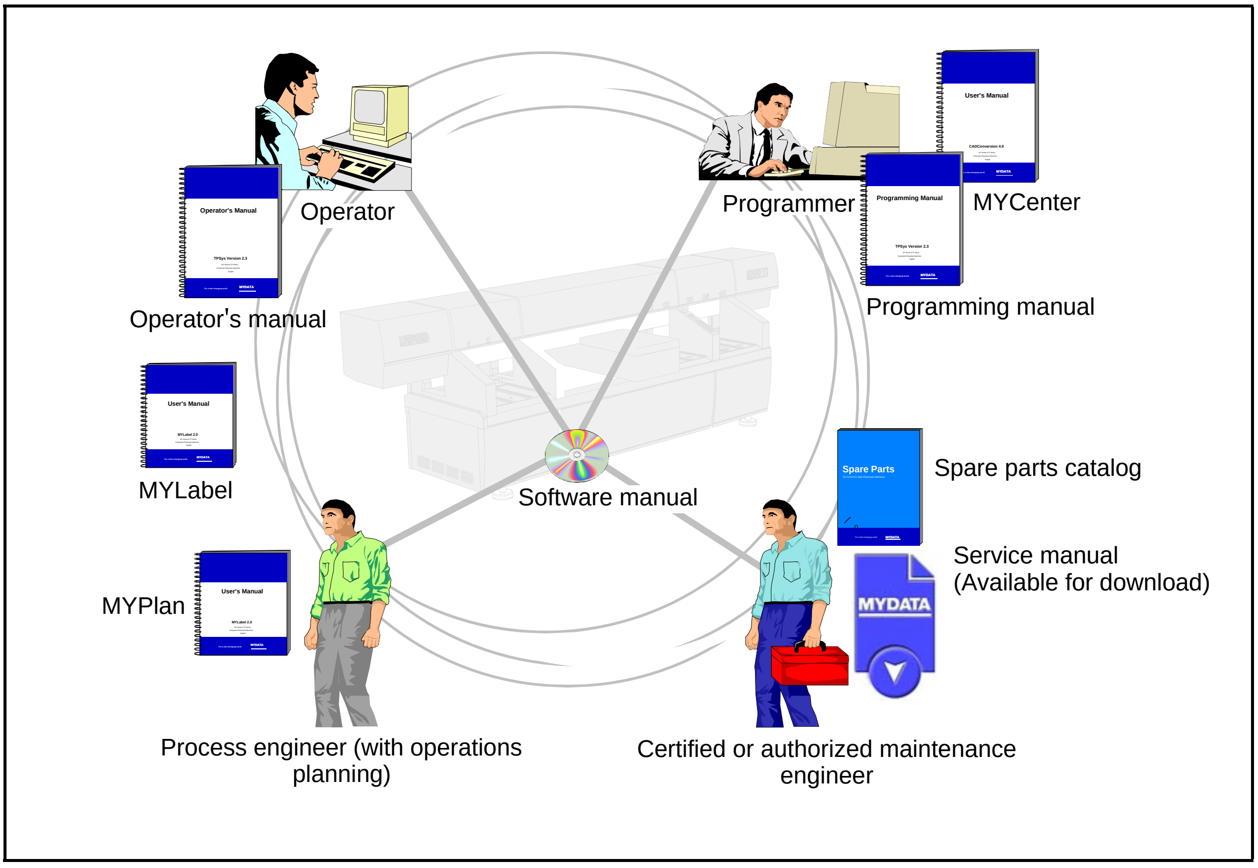
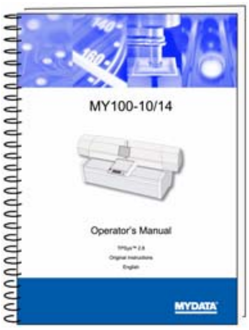


Figure B-1. Document structure.

These documents and some supplementary software products are described on the following pages.

Operator's Manual



An operator's manual is available for the MY100 type of MYDATA pick and place machines.

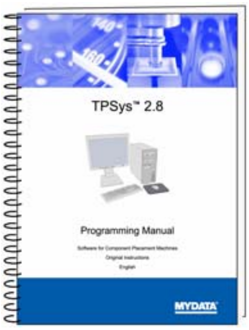
This manual is provided with each machine.

The operator's manual is available in the same languages as the TPSys software.

The operator's manual contains information to assist the operator to start and operate the system, load components and handle magazines and trays.

Information about safety, daily maintenance, HYDRA, TEX Tray Exchanger, and Tray Wagon Magazine operation is also included in the operator's manual.

Programming Manual



A programming manual is available for TPSys version 2.9 that covers all MYDATA pick and place machine types running TPSys version 2.9.

This manual is provided with each machine.

The programming manual is not available in the same languages as the TPSys software, but in the majority of these languages.

The programming manual contains basic information about the machine movements, such as coordinates, fiducial marks, angles, centering, verification, how to program boards, create mount lists, and complete component and package lists.

Information about pre-programmed packages, HYDRA, TEX Tray Exchanger, and Tray Wagon Magazine programming is also included in the programming manual.

Service Manual

A service manual for the MY100 type of MYDATA pick and place machines can be downloaded from MYDATA Interactive Support web site (http://support.mydata.com/).

You will need to enter your Interactive Support account username and password. If you do not yet have an account, contact your local MYDATA sales representative who will issue you with one. Contact details can be found on http://www.mydata.com.

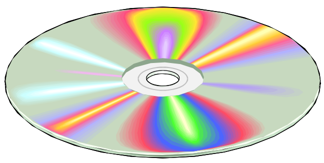
This manual is also provided on a CD with each machine. A hard copy can be ordered from MYDATA.

The service manual is available in English only.

The service manual contains descriptions, service instructions, and calibration guidelines for the machine.

Information about safety, maintenance, and common optional devices and systems are also included in the service manual.

Software Manual



A software manual is available for TPSys version 2.9 that covers all MYDATA pick and place machines running TPSys version 2.9.

This manual is provided with each machine.

The software manual is available on a CD in English. A hard copy can be ordered from MYDATA.

The software manual contains a system overview, Linux description, import/export information, back up/restore instructions, and network communication.

The software manual contains also a message reference guide, containing TPSys messages with descriptions.

Spare Parts Catalog

A spare parts catalog, containing information, figures and part numbers on the most common spare and consumable parts, is available from MYDATA.

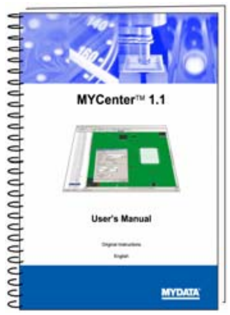
The spare parts catalog is available in English only.

Supplementary Software

MYDATA provides supplementary software that facilitates the programming work in TPSys.

This software may be mentioned somewhere in this manual but it will not be described here. Refer to the manual for the respective product.

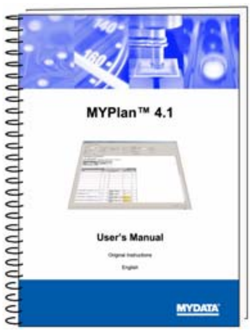
MYCenter



MYCenter is a Windows-based software which is primarily designed to aid the production engineer when planning and performing jobs in the SMT production environment. The main purpose of the software suite is to facilitate for the production engineer when performing almost any job when producing PCBs for the placement machines.

The MYCenter software package includes a comprehensive *MYCenter, User's Manual*.

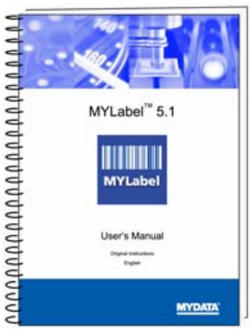
MYPlan



MYPlan is a Windows-based software developed for scheduling board assemblies in MYDATA placement machines. The purpose of the software is to provide the operator with appropriate loading instructions to increase the placement machine performance. MYPlan calculates the best possible solution to place the components under certain circumstances.

The MYPlan software package includes a comprehensive *MYPlan, User's Manual*.

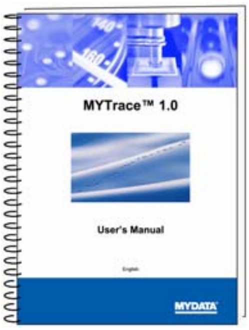
MYLabel



MYLabel keeps track of component carriers (tapes, sticks) used in production by using barcodes. MYLabel uses an identification barcode linked to a database with component names, quantities, and batch information. The database also contains component information, such as stock location and owner.

The MYLabel software package includes a comprehensive *MYLabel, User's Manual*.

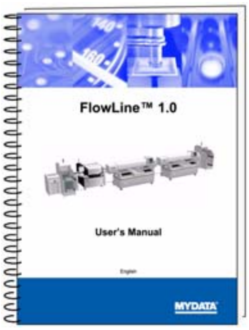
MYTrace



MYTrace is Windows-based software, developed primarily for tracing defective components mounted by MYDATA pick and place machines. MYTrace consists of two applications, MYTrace Harvester and MYTrace Viewer.

The MYTrace software package includes a comprehensive *MYTrace Manual*.

FlowLine



FlowLine is a is a software package which is used to keep the switch over time for an automated production line to a minimum. This is done by automatically issuing work orders to machines in the production line, when a board magazine is inserted into a loader, the line.keeps track of component carriers (tapes, sticks) used in production by using barcodes.

The FlowLine software package includes a comprehensive *FlowLine Manual*.

Index

V

W

Z

SWEDEN
Micronic Mydata AB
Visit: Nytorpsvägen 9
PO Box 3141
SE-183 03 TÄBY
Sweden
Tel: +46 8 638 52 00
Tel: +46 8 638 52 90

FRANCE
MYDATA automation S.A.
13 Rue de Norvège BP122
91944 Courtaboeuf Cedex
France
Tel: +33 1 69 59 24 34
Fax: +33 1 69 28 71 00

GERMANY
MYDATA Royonic GmbH
Wächterhofstrasse 50
85635 Höhenkirchen
Germany
Tel: +49 8102 749090
Fax: +49 8102 749098

JAPAN
MICRONIC JAPAN K.K.
MYDATA Division
Mitsugi-Kotobukicho Bldg. 1st floor
1-1-3, Kotobuki-cho, Fuchu-shi,
Tokyo 183-0056
Japan
Tel: +81 42 354 1334
Fax: +81 42 354 1335

USA
MYDATA automation, Inc
320 Newburyport Turnpike
Rowley MA 01969-2002
USA
Tel: +1 978 948 6919
Fax: +1 978 948 6915

BENELUX
MYDATA automation B.V.
Eindhoven Airport
Flightforum 880
5657 DV, Netherlands
Tel: +31 402 62 06 67
Fax: 31 402 62 06 68

UK
MYDATA automation Ltd
Unit 2, Concept Park
Innovation Close
Poole, Dorset, BH12 4QT
United Kingdom
Tel: +44 1202 723 585
Fax: +44 1202 723 269

CHINA
MYDATA automation, Shanghai
Block 4, No. 700 Gui Ping Road,
Cao He Jing Hi-Tech Park,
Shanghai 200233, China
Tel: +86 21 6485 5389
Fax: +86 21 6485 7208

SINGAPORE
MYDATA Asia Pte Ltd.
Asiawide Industrial Building
5 Pereira Road, #01-01
Singapore 368 025
Tel: +65 6281 7997
Fax: +65 6281 7667

www.mydata.com
info@mydata.se